

# FINAL Site Inspection Report Fort William Henry Harrison Helena, Montana

Perfluorooctanesulfonic Acid (PFOS) and  
Perfluorooctanoic Acid (PFOA) Impacted Sites  
ARNG Installations, Nationwide

August 2021

Prepared for:



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## Acronyms and Abbreviations

6:2 FTS	6:2 Fluorotelomer sulfonate
8:2 FTS	8:2 Fluorotelomer sulfonate
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
°C	degrees Celsius
°F	degrees Fahrenheit
AECOM	AECOM Technical Services, Inc.
AFFF	aqueous film forming foam
amsl	above mean sea level
AOI	Area of Interest
Argonne	Argonne National Laboratory
ARNG	Army National Guard
ATSDR	Agency for Toxic Substances and Disease Registry
bgs	below ground surface
CDM	Camp Dresser, and McKee
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	chain-of-custody
CSM	conceptual site model
DA	Department of the Army
DASA ESOH	Deputy Assistant Secretary of the Army for Environment, Safety and Occupational Health
DO	dissolved oxygen
DoD	Department of Defense
DPW	Department of Public Works
DRFS	Dominion Restoration's Foaming Surfactant
DQI	data quality indicator
DQO	Data Quality Objective
DRFS	Dominion Restoration's Foaming Surfactant
DUA	data usability assessment
EIS	extracted internal standard
ELAP	Environmental Laboratory Approval Program
FRB	Field Reagent Blank
FTA	firefighting training area
FTWHH	Fort William Henry Harrison
GCAL	Gulf Coast Analytical Laboratories, LLC
HA	Health Advisory
HDPE	high-density polyethylene
HSA	hollow stem auger
IDW	investigation-derived waste
ITRC	Interstate Technology Regulatory Council
LC/MS/MS	liquid chromatography with tandem mass spectrometry
LCS	laboratory control spike
LCSD	laboratory control spike duplicate

LOD	level of detection
LOQ	level of quantitation
MBMG	Montana Bureau of Mines and Geology
MDL	method detection limit
mph	miles per hour
MS	matrix spike
MSD	matrix spike duplicate
MTARNG	Montana Army National Guard
MTDEQ	Montana Department of Environmental Quality
NELAP	National Environmental Laboratory Accreditation Program
NEtFOSAA	N-ethyl perfluorooctanesulfonamidoacetic acid
ng/L	nanograms per liter
NMeFOSAA	N-methyl perfluorooctanesulfonamidoacetic acid
ORP	oxidation reduction potential
OSD	Office of the Secretary of Defense
PA	Preliminary Assessment
PFAS	per- and polyfluoroalkyl substances
PFBA	perfluorobutyrate
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFDaA	perfluorododecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid
PFTeDA	perfluorotetradecanoic acid
PFTrDA	perfluorotridecanoic acid
PFUdA	perfluoroundecanoic acid
PID	photoionization detector
PPE	personal protective equipment
PQAPP	Programmatic UFP-QAPP
PRC	PRC Environmental Management, Inc.
PVC	polyvinyl chloride
QAPP	Quality Assurance Project Plan
QC	quality control
QSM	Quality Systems Manual
RI	Remedial Investigation
RPD	relative percent differences
SI	Site Inspection
SL	screening level
TOC	total organic carbon
TPP	Technical Project Planning
UFP	Uniform Federal Policy

US	United States
USACE	United States Army Corps of Engineers
USCS	Unified Soil Classification System
USGS	United States Geological Survey
USEPA	United States Environmental Protection Agency
VA	Veterans Administration

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## Executive Summary

The Army National Guard (ARNG) is performing Preliminary Assessments (PAs) and Site Inspections (SIs) at per- and polyfluoroalkyl substances (PFAS)-impacted sites at ARNG facilities nationwide. The objective of the SI at each facility is to identify whether there has been a release to the environment from the Areas of Interest (AOIs) identified in the PA and determine the presence or absence of perfluorooctanoic acid (PFOA), perfluorooctanesulfonic acid (PFOS), and perfluorobutanesulfonic acid (PFBS) at or above screening levels (SLs), as well as the presence or absence of an additional 15 PFAS. An SI was completed at Fort William Henry Harrison (FTWHH) in Helena, Montana. FTWHH will be referred to as the 'facility' throughout this document.

FTWHH is in Lewis and Clark County, approximately 4 miles west of the state capitol of Helena, Montana. The facility is bounded by the Scratchgravel Hills to the north, the Spokane Bench to the east, the Elkhorn Mountains to the south, and the General Eisenhower Mountains to the west. During the PA, ten potential PFAS release areas were grouped into three AOIs (AOI 1 through 3). Results from the first mobilization performed in 2019 identified three additional release areas that potentially exist at the facility and one directly off-site across Williams Street. SI field activities were conducted in two mobilizations. The first mobilization included permanent groundwater monitoring well installation, development, and sampling; surface and subsurface soil sampling; and groundwater sampling from existing wells from 10 to 20 February 2019 and from 19 to 31 May 2019. The second mobilization included permanent groundwater monitoring well installation, development, and sampling; surface and subsurface soil sampling; and groundwater sampling from existing wells from 5 to 15 October 2020.

To fulfill the project Data Quality Objectives (DQOs) set forth in the approved SI Quality Assurance Project Plan (QAPP) Addendum (AECOM, 2019), samples were collected and analyzed for a subset of 18 PFAS by liquid chromatography with tandem mass spectrometry (LC/MS/MS) compliant with Quality Systems Manual (QSM) 5.1 Table B-15. The 18 PFAS analyzed as part of the ARNG SI program are specific in **Section 5.8** of this Report.

The Department of Defense (DoD) has adopted a policy to retain facilities in the Comprehensive Environmental Restoration, Compensation, and Liability Act (CERCLA) process based on risk-based SLs for soil and groundwater, as described in a memorandum from the Office of the Secretary of Defense (OSD) dated 15 October 2019 (Assistant Secretary of Defense, 2019). The ARNG PFAS SIs follow this DoD policy and, when the maximum site concentration for sampled media exceed the SLs, the AOI will proceed to a Remedial Investigation (RI), the next phase under CERCLA. The SLs apply to three compounds, PFOA, PFOS, and PFBS, for both soil and groundwater, as presented in **Table ES-1**. All other results presented in this report are considered informational in nature and serve as an indication as to whether soil and groundwater contain or do not contain the 18 PFAS analyzed within the boundaries of the facility.

Sample chemical analytical concentrations were compared against the project SLs as described in **Table ES-1**. A summary of the results of the SI data relative to the SLs is as follows:

- PFOS was detected in groundwater at 62.2 nanograms per liters (ng/L) at AOI1-MW3 in excess of the SL. Based on the results of the SI, further evaluation of AOI 1 is warranted in the RI.
- PFOS was detected in groundwater at 118 ng/L at AOI2-MW1 in excess of the SL. Based on the results of the SI, further evaluation of AOI 2 is warranted in the RI.
- Additional offsite residential drinking water sampling is recommended due to the SL groundwater exceedance of PFOS at AOI 1 and AOI 2.

- The detected concentrations of PFOA, PFOS, and PFBS in soil samples from all AOIs were below the SLs.

**Tables ES-2** summarizes the SI results for soil and groundwater. Based on the conceptual site models (CSMs) developed and revised in light of the SI findings, there is potential for exposure to residential drinking water receptors caused by DoD activities at or adjacent to the facility.

**Table ES-3** summarizes the rationale used to determine if an AOI should be considered for further investigation under CERCLA and undergo an RI. Based on the results of this SI, further evaluation is warranted in the RI for AOI 1 and AOI 2.




























**Table ES-1 Screening Levels (Soil and Groundwater)**

Analyte	Residential (Soil) (µg/kg) <sup>a</sup> 0-2 feet bgs	Industrial/ Commercial Composite Worker (Soil) (µg/kg) <sup>a</sup> 2-15 feet bgs	Tap Water (Groundwater) (ng/L) <sup>a</sup>
<b>PFOA</b>	130	1,600	40
<b>PFOS</b>	130	1,600	40
<b>PFBS</b>	130,000	1,600,000	40,000

**Notes:**

a.) Assistant Secretary of Defense, 2019. Risk Based Screening Levels Calculated for PFOS, PFOA, PFBS in Groundwater and Soil using United States Environmental Protection Agency's (USEPA's) Regional Screening Level Calculator. HQ=0.1. 15 October 2019.

**Table ES-2 Summary of Site Inspection Findings**

AOI	Potential PFAS Release Area	Soil – Source Area	Groundwater – Source Area	Groundwater – Facility Boundary
1	Mt. Defensa Avenue Drainage Ditch			
1	1049th Engineer Detachment Building 1010			NA
1	Prairie Dog Relocation (three locations)		NA	NA
1	1049th Firefighting Training Area 1			NA
1	1049th Firefighting Training Area 3		NA	NA
1	MacDonald Property			NA
2	Former Weasel Barn			
2	Excavated Soil from Mt. Defensa Ave Drainage Ditch			
2	1049th Engineer Detachment Building M1			
2	1049th Firefighting Training Area 4			NA
3	Planned Structure Fire			NA
3	Burial Trench	NA		NA
3	1049th Firefighting Training Area 2			NA

**Legend:**

NA = Not applicable (samples not at facility boundary)



= detected; exceedance of the screening levels



= detected; no exceedance of the screening levels



= not detected

**Table ES-3 Site Inspection Recommendations**

AOI	Description	Rationale	Future Action
1	Mt. Defensa Avenue Drainage Ditch, 1049th Engineer Detachment Building 1010, 1049th Firefighting Training Area 1, 1049th Firefighting Training Area 3	No exceedances of SL in groundwater at the source area; however, exceedances of SLs in groundwater at the facility boundary. No exceedances of SLs in soil.	Proceed to RI
1	Prairie Dog Relocation (Three Release Areas)	No exceedances of SLs in soil.	No further action
2	Former Weasel Barn, Excavated Soil from Mt. Defensa Ave Drainage Ditch, 1049th Firefighting Training Area 4	No exceedances of SL in groundwater at the source area; however, exceedances of SLs in groundwater at the facility boundary. No exceedances of SLs in soil.	Proceed to RI
2	1049th Engineer Detachment Building M1	No exceedances of SLs in groundwater or soil.	No further action
3	Planned Structure Fire, Burial Trench, and 1049th Firefighting Training Area 2	No exceedances of SLs in groundwater or soil.	No further action

# 1. Introduction

## 1.1 Project Authorization

The Army National Guard (ARNG) G9 is the lead agency in performing Preliminary Assessments (PAs) and Site Inspections (SIs) for perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) at Impacted Sites, ARNG Installations, Nationwide. This work is supported by the United States (US) Army Corps of Engineers (USACE) Baltimore District and their contractor, AECOM Technical Services, Inc. (AECOM), under Contract Number W912DR-12-D-0014, Task Order W912DR17F0192, issued 11 August 2017. The ARNG performed this SI at Fort William Henry Harrison (FTWHH) in Helena, Montana. FTWHH will be referred to as the 'facility' throughout this document.

The SI project elements were performed in compliance with Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA; United States [US] Environmental Protection Agency [USEPA], 1980), as amended, the National Oil and Hazardous Substances Pollution Contingency Plan (40 Code of Federal Regulations [CFR] Part 300; USEPA, 1994), and in compliance with US Department of the Army (DA) requirements and guidance for field investigations including specific requirements for sampling for PFOA, PFOS, and perfluorobutanesulfonic acid (PFBS), and the group of related compounds known in the industry as per- and polyfluoroalkyl substances (PFAS). The term PFAS will be used throughout this report to encompass all PFAS chemicals being evaluated, including PFOA, PFOS, and PFBS, which are the key components of the suspected releases being evaluated, and the other 15 related compounds listed in the task order.

## 1.2 SI Purpose

A PA was performed at FTWHH (AECOM, 2018c) that identified ten potential PFAS release areas which were grouped into three Areas of Interest (AOIs). Results from the first mobilization performed in 2019 identified three additional release areas potentially existed at the facility and one directly off-site across Williams Street. The objective of the SI is to identify whether there has been a release to the environment from the AOIs and determine the presence or absence of PFOA, PFOS, and PFBS at or above screening levels (SLs).

As stated in the *Federal Facilities Remedial Site Inspection Summary Guide* (USEPA, 2005), an SI has five goals:

- 1) Develop information to potentially eliminate a release from further consideration because it is determined that it poses no significant threat to human health or the environment.
- 2) Determine the potential need for a removal action.
- 3) Collect or develop data to evaluate potential release.
- 4) Collect data to better characterize the release for more effective and rapid initiation of a Remedial Investigation (RI).
- 5) Collect data to determine whether the release is more than likely the result of activities associated with the Department of Defense (DoD).

In addition to the USEPA-identified goals of an SI, the ARNG SI also identifies whether there are potential offsite PFAS sources.

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## 2. Site Background

### 2.1 Facility Location and Description

FTWHH is in Lewis and Clark County, approximately 4 miles west of the state capitol of Helena, Montana (**Figure 2-1**). The facility houses the headquarters of the Montana ARNG (MTARNG) and occupies 6,717 acres.

FTWHH was authorized by an act of Congress in 1892 and was constructed between 1894 and 1896 (Argonne National Laboratory [Argonne], 1993). In 1903, the War Department changed the installation's name from Fort Benjamin Harrison to Fort William Henry Harrison. The MTARNG began using FTWHH for training in 1911; however, FTWHH remained an active US Army post until 1913 (MTARNG, 2001; Argonne, 1993). In 1913, FTWHH was placed in caretaker status by the US Army and was periodically occupied by the MTARNG until 1919 (MTARNG, 2001). In 1919, the US Public Health Service took possession of the facility and began to operate a hospital, which is currently under the jurisdiction of the Federal Government and is operated by the Veterans Administration (VA). From 1924 to 1928, the State of Montana expanded the facility area by leasing surrounding land. The MTARNG was absent from the facility from 1940 to 1946. During that time, the US Army assumed control and used FTWHH as a training base and further expanded the facilities. FTWHH has been used for training by the MTARNG since 1947 (Argonne, 1993). FTWHH was under the jurisdiction of the Federal Government until 1966, when it was converted to a training site for ARNG, transferring management to the Montana Department of Military Affairs. The current lease, which began in 1986, extended the lease for an indefinite term.

### 2.2 Facility Environmental Setting

FTWHH is within the Northern Rocky Mountain physiographic province on the western edge of Helena Valley (PRC Environmental Management, Inc. [PRC] 1996). Helena Valley is a northwest-trending, oval shaped basin that is approximately 875 square miles and is surrounded by mountains (MTARNG 2001). The facility is bounded by the Scratchgravel Hills to the north, the Spokane Bench to the east, the Elkhorn Mountains to the south, and the General Eisenhower Mountains to the west (MTARNG 2001; PRC 1996). Elevations at FTWHH range from 5,318 feet above mean sea level (amsl) at the western boundary to approximately 4,060 feet amsl in the northeast corner (Camp Dresser, and McKee [CDM], 2006). The Continental Divide is approximately 5 miles west of the facility (MTARNG, 2001).

#### 2.2.1 Geology

Helena Valley is bounded by folded and fractured sedimentary, metamorphic, and igneous bedrock of Precambrian to Cretaceous age (US Geological Survey [USGS], 1992). The valley fill has been mapped with thicknesses of up to 6,000 feet with source materials consisting of fine- and coarse-grained Tertiary materials. The valley fill is unconformably overlain by up to 100 feet of Quaternary alluvium (Montana Department of Environmental Quality [MTDEQ], 2006).

FTWHH is on gently sloping pediment gravels at the base of General Eisenhower Mountains between two principal streams flowing into Helena Valley: Sevenmile Creek to the north and Tenmile Creek to the south (MTARNG 2001; CDM 2006). Quaternary alluvial deposits form the uppermost unit (**Figure 2-2**). The thickness of the alluvial deposits is highly variable and is predominantly thicker in the northern half of the facility (MTARNG, 2001). The gravel layers of the alluvium are made up of fragments of quartzite, shale, and limestone between layers of clay and silt (MTARNG, 2001).

Precambrian rocks crop out in the hills and mountains to the south, west, and north of FTWHH and underlie it at depths ranging from 80 to 100 feet. The Precambrian bedrock consists mainly

of argillite, feldspathic quartzite, limestone, and dolomite of the Empire and Helena formations and members of the Missoula Group (Argonne, 1993).

### 2.2.2 Hydrogeology

Stratified lenses of cobbles, gravel, and sand form the primary Helena Valley aquifer. The water bearing zones, intercalated clay, and silt compose the upper few hundred feet of the valley fill. Discontinuity of the clay and silt deposits allows for hydraulic connection of the water bearing zones to make up a single complex aquifer (USGS, 1992). The estimated transmissivity of the water bearing zones is 10,000 square feet per day (Argonne, 1993).

The principal water bearing zones at FTWHH are Quaternary alluvium and Tertiary pediments deposits. The unconfined Quaternary aquifer attains a maximum saturated thickness of about 70 feet in the southern half of the facility and is largely absent near the northeastern corner (Argonne, 1993).

The depth to groundwater at the facility is typically between 14 and 43 feet below ground surface (bgs). In 1992, the USGS estimated that 60% of the wells near the facility are drilled to 70 feet bgs or less.

Regionally, groundwater in the Helena Valley aquifer flows from the south, west, and north margins of the valley toward the northeast corner of the Helena Valley basin (USGS, 1992) and Lake Helena (**Figure 2-2**). Locally at FTWHH, the groundwater flow direction is predominantly to the east in the southern half of the installation and to the east-southeast in the northern part of the installation (MTDEQ, 2006). Depth to water measurements from the May 2019 and October 2020 synoptic gauging event were used to calculate groundwater elevations. The groundwater contours for May 2019 and October 2020 are shown in **Figure 2-3** and **Figure 2-4**, respectively.

Recharge to the Helena Valley aquifer is through infiltration of streamflow and precipitation, leakage from irrigation canals, infiltration of excess irrigation water, and inflow from underlying bedrock fractures (USGS, 1992). Lake Helena is the primary point for surface water and groundwater discharge from the basin. Discharge also occurs to stream and irrigation canals and withdrawals from wells (USGS, 1992).

Although it is outside Helena city limits, FTWHH draws from the City of Helena water supply. The city uses a combination of groundwater and surface water (the Missouri River and Tenmile Creek) as sources for its residents (Helena Water Utilities Public Water System, 2004; Department of Public Works [DPW], 2012). The Eureka Well is the source of potable water for FTWHH and is approximately 3 miles southeast of the facility, in the downtown Helena area (DPW, 2012). According to the 2018 Consumer Confidence Report (DPW, 2012), the Eureka Well is a pure groundwater source that requires no further treatment. In addition, the City of Helena was selected to participate in the Third Unregulated Contaminant Monitoring Rule assessment monitoring, and no PFAS were detected for Helena, Montana. A search of the Montana Bureau of Mines and Geology (MBMG) Groundwater Information System confirmed the presence of domestic water supply wells adjacent to FTWHH (MBMG, 2018). Residential lots east of Williams Street were identified as having private wells.

### 2.2.3 Hydrology

FTWHH is within the Sevenmile Creek watershed (CDM, 2006) (**Figure 2-5**). Three perennial streams and a number of intermittent streams that originate in the foothills west of the facility flow through the facility (Argonne, 1993; CDM, 2006). Cherry Creek is a perennial stream that flows east through training and maneuver areas at FTWHH (MTARNG, 2001). Granite Creek is a perennial tributary of Sevenmile Creek that flows northeast through the northern third of the facility (MTARNG, 2001). Blue Cloud Creek, a perennial tributary of Tenmile Creek, crosses the extreme southwestern corner of the facility, and drains an area of undeveloped land on the western and



southwestern side (MTARNG, 2001; CDM, 2006). Blue Cloud Creek and Granite Creek do not drain the Cantonment Area. The rest of the streams on FTWHH are intermittent and occur during heavy rainfall or rapid snowmelt.

Sevenmile Creek and Tenmile Creek are the largest perennial streams near the facility (CDM, 2006). Sevenmile Creek joins Tenmile Creek about 1 mile east of the downstream property boundary (Argonne, 1993; CDM, 2006). The water diverted upgradient of FTWHH from the upper Tenmile Creek watershed provides about 70% of the municipal supply for Helena from June through September, and 100% of the city supply from October through May (USGS, 2000). Streamflow in the lower Tenmile Creek, which runs south of FTWHH, is partly controlled by two small municipal-supply reservoirs (Scott and Chessman) in the upper Tenmile Creek watershed and by diversions for municipal water supply and irrigation (USGS, 2001). In addition, a 30-acre spring-fed man-made lake exists approximately 1 mile southeast of the facility within Spring Meadow State Park. The lake is a popular swimming, fishing, and recreational area for Helena residents.

A large, unnamed drainage ditch runs from west to east through the VA property adjacent to FTWHH, along Mt. Defensa Avenue, and offsite by the Main Gate. For the purposes of this report, this drainage ditch will be referred to as the Mt. Defensa Avenue Drainage Ditch. Precipitation, snow melt, and other surface runoff on the VA property and much of the Cantonment Area is captured in the Mt. Defensa Avenue Drainage Ditch, which flows to the Main Gate on Williams Street and offsite. During rapid snow melt or high intensity rain events, runoff is channelized and flows rapidly through the ditch and Cantonment Area discharging just outside the Main Gate of the facility. As a result of the high velocity flow, limited runoff infiltrates into the subsurface of Mt. Defensa Avenue Drainage Ditch itself. Surface water runoff that reaches the Main Gate dissipates and infiltrates the subsurface and may reach groundwater.

## 2.2.4 Climate

The climate at FTWHH is semiarid (USGS, 1992). In December, the average temperature is 32 degrees Fahrenheit (°F). July and August have the highest average temperatures, at 86°F and 85°F, respectively. The greatest mean monthly precipitation occurs in June, and the greatest mean monthly snowfall occurs in January (World Climate, 2019). The average annual precipitation is 12.12 inches at the Helena Regional Airport weather station, approximately 6 miles southeast of the facility.

The area is subject to hailstorms. Flash flooding can occur in the Helena Valley during heavy rainstorms and rapid snowmelt (Argonne, 1993). The frost-free period is usually from May to September. Winds generally blow westerly at about 7 to 8 miles per hour (mph), and stronger gusts can reach 55 to 65 mph (MTARNG, 2001). Brisk westerly and northwesterly winds are common, particularly in the late winter and early spring. Chinook winds, which produce warmer temperatures in the winter months, are also common (Argonne, 1993).

## 2.2.5 Current and Future Land Use

FTWHH contains a cantonment area with dining and support facilities and five training range areas for the ARNG, the US Armed Forces, and other government and civilian organizations to practice combat skills and operations; access to the facility is controlled. The VA controls property immediately adjacent to the south and west of the Cantonment Area. Land use to the east, west, and north of the facility is primarily agricultural with scattered farms and residences, grazing land, and hilly to mountainous terrain. Land use to the south is a mixture of residential and agricultural.

The nearest urban area is Helena. According to the 2016 US Census, the estimated population of Helena is 31,169 (US Census Bureau, 2016). Helena has experienced significant population growth over the last decade, and several agricultural lands have been converted to residential subdivisions and single-resident lots to accommodate the growth (MTARNG, 2001). Lands to the

east and north of FTWHH are designated as urban growth areas for Lewis and Clark County. Land use to the south and west is not expected to change.

The influx of people and need for new housing in the vicinity of FTWHH has created the possibility of encroachment or intrusion on the land or property owned by the MTARNG (Nakata Planning Group, LLC, 2000). In 2015, the Prickly Pear Land Trust acquired 558 acres in the area east of Williams Street in partnership with FTWHH with funding from the Army Compatible Use Buffer Program to address the encroachment concerns. This land is designated for open space and habitat (Westech Environmental Services, Inc., 2017).

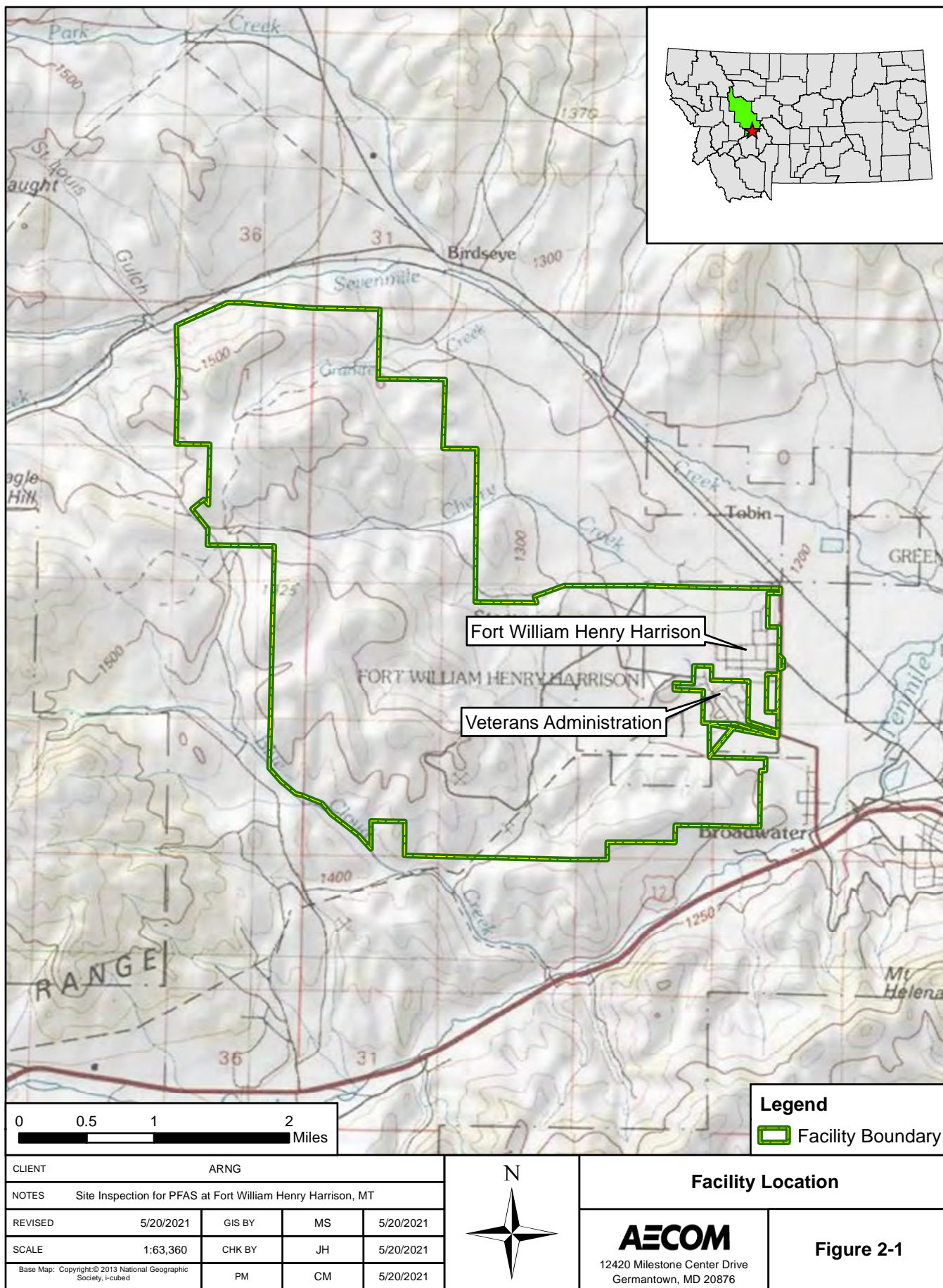
## 2.3 History of AFFF Use

Ten potential PFAS release areas, where aqueous film forming foam (AFFF) may have been used or released historically, were identified at FTWHH during the PA (AECOM, 2018c). The potential PFAS release areas were grouped into three AOIs based on proximity to one another and presumed groundwater flow. A description of each AOI is presented in **Section 3**. Findings from the PA indicated AFFF use at the facility primarily ranged from the late-1980s to the early-2000s. AFFF was historically used by the MTARNG during fire training activities (planned structural fires and training exercises) and pest removal activities (prairie dog relocation). AFFF was stored in several buildings at the facility during this time, but no releases were documented in these areas.

## 2.4 Drinking Water Sampling

Due to historical fire training activities completed with AFFF, the potential exists for exposure to offsite residential drinking water receptors immediately east of the FTWHH boundary. Prior to sampling, approval was obtained from the Deputy Assistant Secretary of the Army for Environment, Safety and Occupational Health (DASA ESOH). Drinking water samples were collected from five potable wells located in closest proximity to the facility boundary (downgradient of AOI 1). No drinking water samples were collected downgradient of AOI 2 and AOI 3 because no residential properties exist at the facility boundary. Sample results are provided below and in **Table 2-1**:

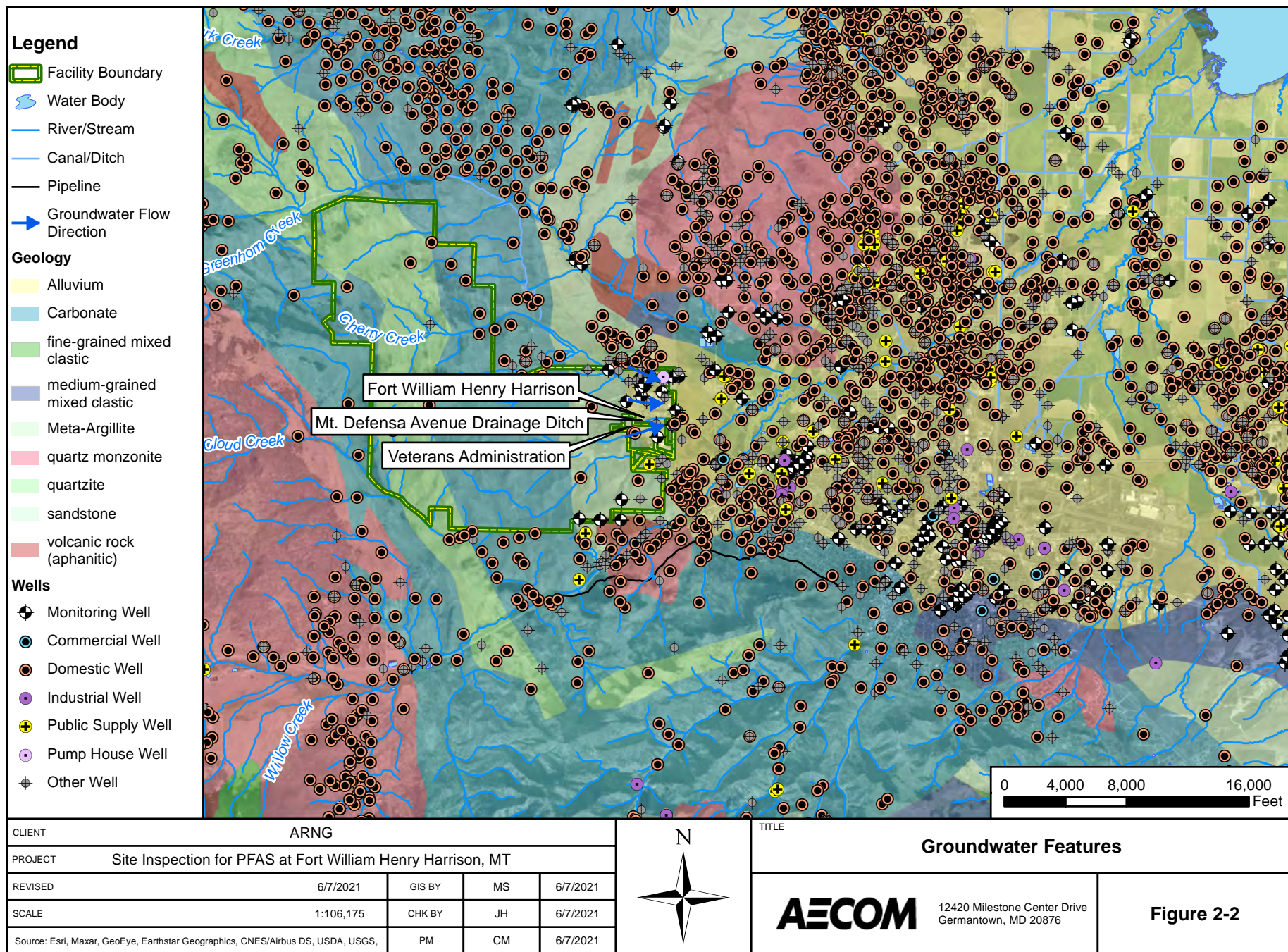
- PFOA – Detections ranged from 3.75 nanogram per liter (ng/L) (Potable-02) to 16.6 ng/L (Potable-05).
- PFOS – Detections ranged from 3.11 ng/L (Potable-02) to 22.1 ng/L (Potable-05).
- PFBS – Detections ranged from 2.48 ng/L (Potable-04) to 21.2 ng/L (Potable-05).



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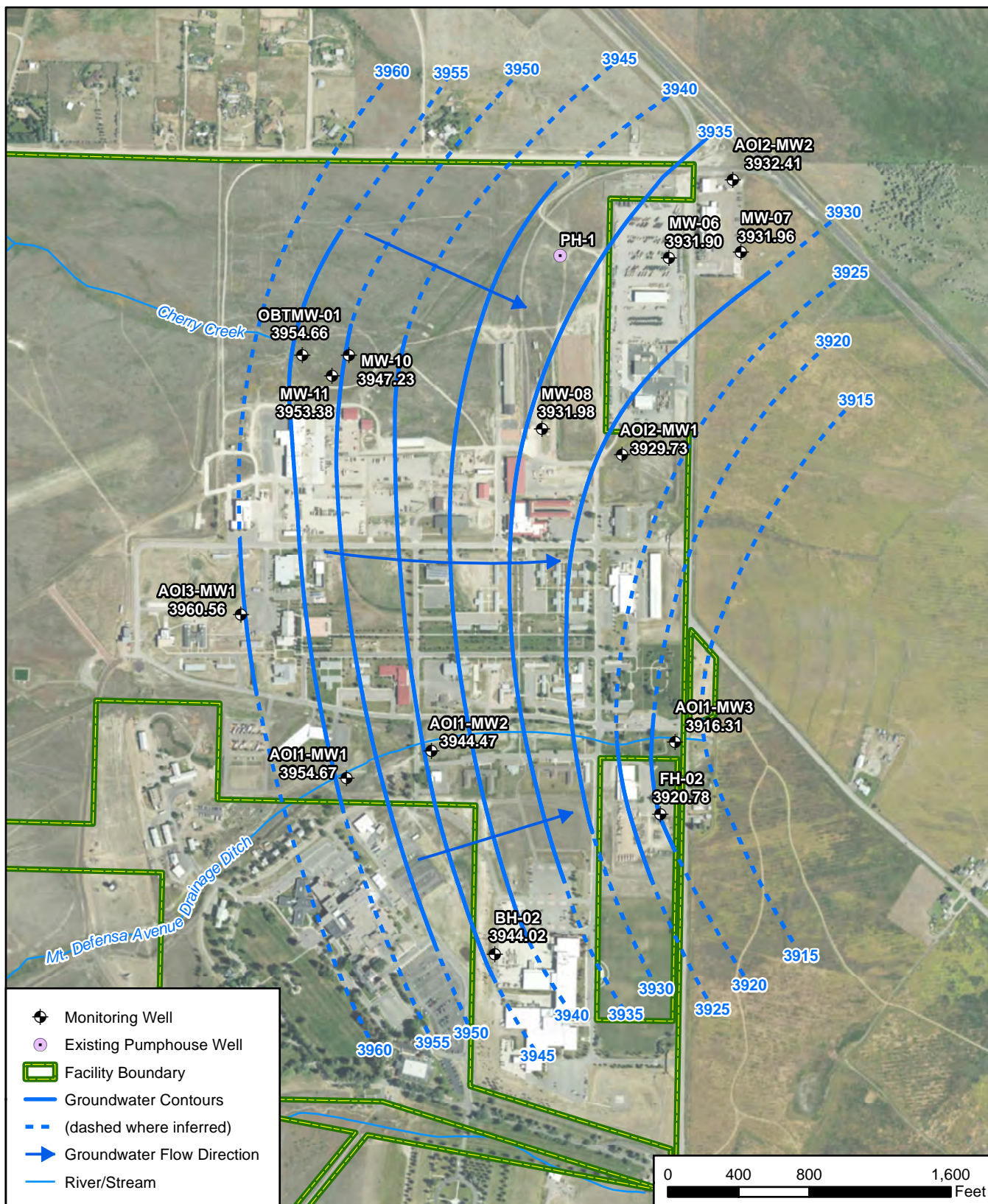




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CLIENT		ARNG			
NOTES		Site Inspection for PFAS at Fort William Henry Harrison, MT			
REVISED	6/7/2021	GIS BY	MS	6/7/2021	
SCALE	1:9,600	CHK BY	JH	6/7/2021	
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	CM	6/7/2021	

N

**Groundwater Elevation Contours, May 2019**

**AECOM**

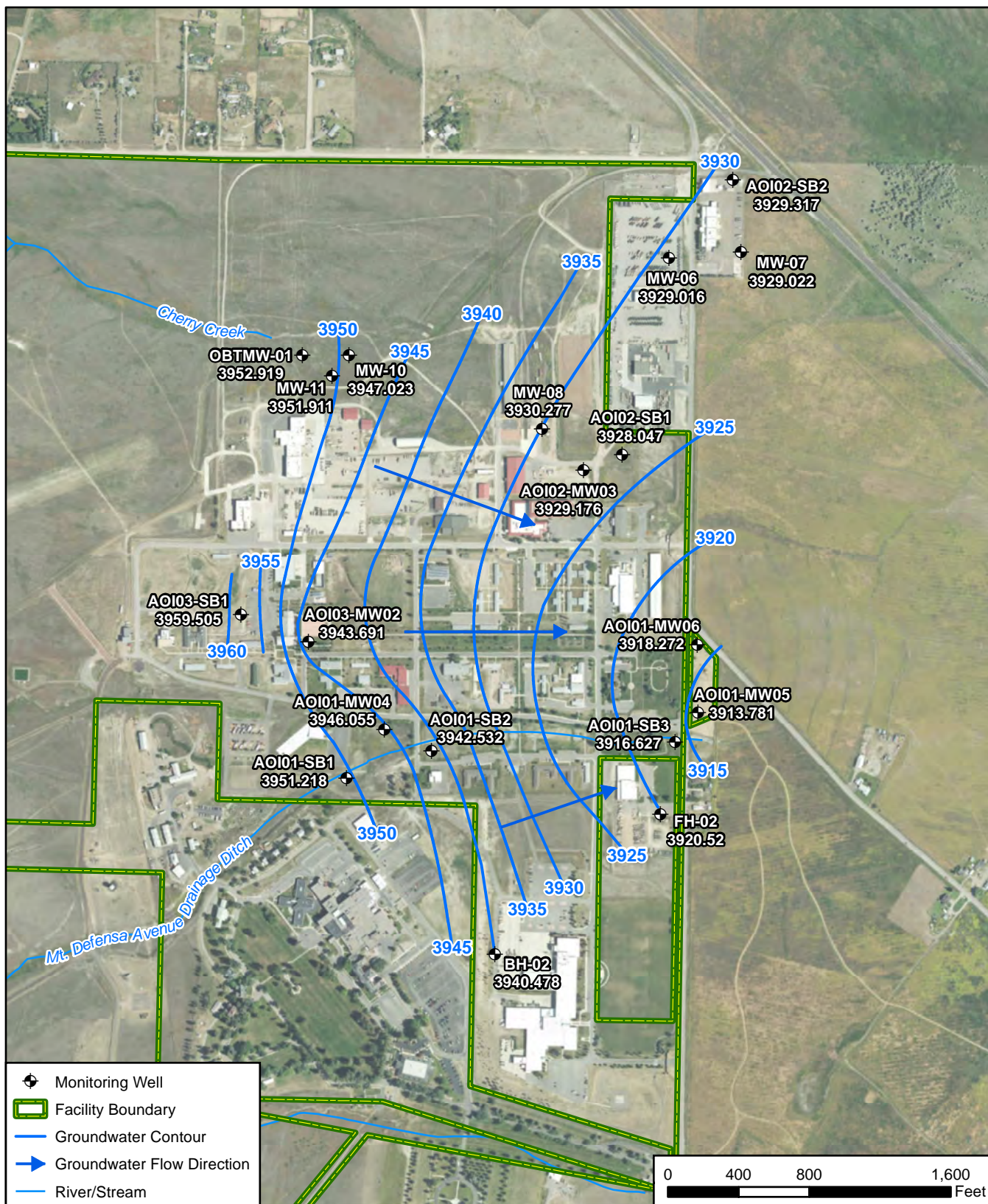
12420 Milestone Center Drive  
Germantown, MD 20876

**Figure 2-3**

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CLIENT		ARNG			
NOTES		Site Inspection for PFAS at Fort William Henry Harrison, MT			
REVISED	6/7/2021	GIS BY	MS	6/7/2021	
SCALE	1:9,600	CHK BY	AB	6/7/2021	
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	CM	6/7/2021	

N

**Groundwater Elevation Contours, October 2020**

**AECOM**

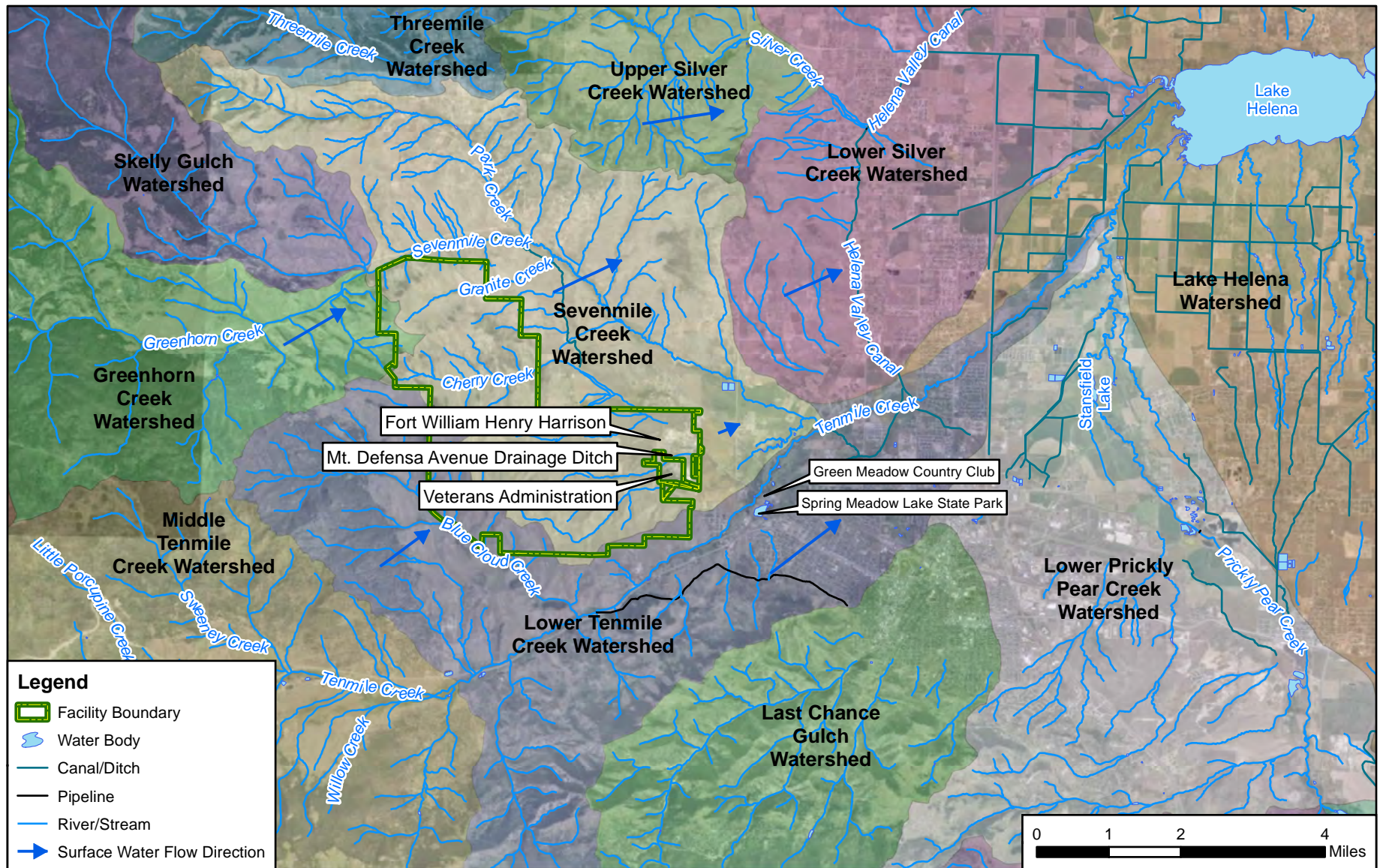
12420 Milestone Center Drive  
Germantown, MD 20876

**Figure 2-4**

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CLIENT	ARNG				
PROJECT	Site Inspection for PFAS at Fort William Henry Harrison, MT				
REVISED	6/7/2021	GIS BY	MS	6/7/2021	
SCALE	1:126,720	CHK BY	JH	6/7/2021	
Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	CM	6/7/2021	



TITLE	Surface Water Features	
<b>AECOM</b>	12420 Milestone Center Drive Germantown, MD 20876	<b>Figure 2-5</b>

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**Table 2-1**  
**PFAS Detections in Residential Drinking Water**  
**Site Inspection Report, Fort William Henry Harrison**

Area of Interest Sample ID Sample Date		POTABLE													
		POTABLE-01		POTABLE-02		POTABLE-02-DUP		POTABLE-03		POTABLE-04		POTABLE-05		POTABLE-05-DUP	
		12/03/2019		12/03/2019		12/03/2019		12/03/2019		12/03/2019		03/16/2020		03/16/2020	
Analyte	EPA HA <sup>a</sup>	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
<b>Water, PFAS via EPA 537.1 (ng/L)</b>															
PFBS	-	7.31	J	4.23	J	4.31	J	2.55	J	2.48	J	21.2		20.6	
PFHpA	-	10.2		3.82	J	4.05	J	5.77	J	3.81	J	20.9		19.1	
PFHxA	-	30.2		13.4		14.2		14.4		10.0		54.1		53.2	
PFHxS	-	59.8		24.3		24.6		19.1		14.6		182		186	
PFOA	70	6.46	J	3.75	J	4.41	J	6.87	J	7.76	J	16.6		16.5	
PFOS	70	17.0		3.11	J	3.15	J	15.4		13.3		19.5		22.1	
Total PFOA+PFOS	70	23.5		6.86		7.56		22.3		21.1		36.1		38.6	

Grey Fill Detected concentration exceeded EPA HA

**References**

a. United States Environmental Protection Agency. 2016. Drinking Water Health Advisory for Perfluorooctanoic Acid (PFOA). Office of Water (4304T). Health and Ecological Criteria Division, Washington, DC 20460. EPA Document Number: 822-R-16-005. May 2016. / EPA. 2016. Drinking Water Health Advisory for Perfluorooctane Sulfonate (PFOS). Office of Water (4304T). Health and Ecological Criteria Division, Washington, DC 20460. EPA Document Number: 822-R-16-004. May 2016.

Interpreted Qualifiers

J = Estimated concentration

Chemical Abbreviations

PFAS	per- and polyfluoroalkyl substances
PFBS	perfluorobutanesulfonic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid

Acronyms and Abbreviations

DUP	Duplicate
EPA	United States Environmental Protection Agency
HA	Health Advisory
Qual	Interpreted Qualifier
ng/L	nanogram per liter
-	Not applicable

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### 3. Summary of Areas of Interest

This section presents a summary of each potential PFAS release area by AOI. The FTWHH PA identified ten potential PFAS release areas which were grouped into three AOIs based on proximity and inferred direction of groundwater flow (**Figure 3-1**). Results from the first mobilization performed in 2019 suggested four additional release areas potentially existed at the facility and directly off-site. Additional PA-level interviews were conducted with site workers, and as a result, four additional potential PFAS releases areas were identified (MTARNG 1049th Firefighting Training Area 1, 2, 3, and 4) within the three existing AOI boundaries. A summary of each AOI is presented below.

#### 3.1 AOI 1

AOI 1 consists of seven potential PFAS release areas as described below, the Black-Tailed Prairie Dog Relocation (three relocation areas), MTARNG 1049th Engineer Detachment (Building 1010), Mt. Defensa Avenue Drainage Ditch, MTARNG 1049th Firefighting Training Area 1, and MTARNG 1049th Firefighting Training Area 3.

##### 3.1.1 Black-Tailed Prairie Dog Relocation

In 1997, the MTARNG began renovations in the southeast section of the Cantonment Area, near the Mt. Defensa Avenue Drainage Ditch. At the time, a colony of black-tailed prairie dogs inhabited the renovation zone. The MTARNG live-trapped and moved the prairie dogs to a previously unoccupied area approximately 0.5 miles north of the Cantonment Area to the Charles M. Russell National Wildlife Refuge (FaunaWest, 1998).

During the last week of trapping in February 1998, an attempt was made to flush remaining prairie dogs from their burrows at multiple locations using a mixture of water and firefighting training foam. The MTARNG 1049th Engineer Detachment recalled using firefighting training foam, not AFFF, to flush the prairie dogs from their burrows. The *Relocation of the Fort Harrison Prairie Dog Colony* (FaunaWest, 1998) contains materials information from Defense Supply Center, Columbus, for Dominion Restoration's Foaming Surfactant (DRFS) in a 3% solution. According to this pamphlet, DRFS is "a solvent free, environmentally acceptable surrogate that was developed to simulate AFFF" and "a non-hazardous, water-based, neutral pH product that is 100 percent completely biodegradable" with the same appearance as AFFF.

The foam mixture was delivered through a 2-inch diameter fire hose from a FTWHH firetruck to approximately 20 prairie dog burrows (combined into three areas). Two prairie dogs were flushed from their burrows, captured, and placed into a live-trap for later release. Approximately 750 gallons of the firefighting training foam mixture were used to flush the prairie dog burrows (FaunaWest, 1998).

Additionally, the MTARNG relocated a black-tailed prairie dog colony that was on the VA property. The colony location was not sampled during the SI because it was outside the boundary of FTWHH.

##### 3.1.2 MTARNG 1049th Engineer Detachment (Building 1010)

The MTARNG 1049th Engineer Detachment currently operates out of Building 1010, which was constructed in 1995 and is located at the southeast corner of Rome Avenue and Middle Road.

AFFF was stored at the MTARNG 1049th Engineer Detachment buildings and was only added to the firetrucks when it was intended for imminent use due to its corrosive action on the storage tanks. No information was available on the concentration or amount of AFFF stored; however, the MTARNG 1049th Engineer Detachment operated two types of trucks: small trucks capable of



holding approximately 40 gallons of solution and large trucks capable of holding approximately 100 gallons of solution. Annual AFFF fire training exercises were conducted by the MTARNG 1049th Fire Department offsite at the Helena Regional Airport and/or at Malmstrom Air Force Base in Great Falls, Montana. No regularly scheduled fire training exercises were conducted at FTWHH.

During fire training exercises, the majority of AFFF added to the trucks was expended. The trucks were washed, and residual AFFF was discharged with the wash water and allowed to dissipate on the ground. Washing and emptying of the trucks occurred at Building 1010 from 1995 to the early 2000s. The discharge was washed into the Mt. Defensa Avenue Drainage Ditch. The last known occurrence of washing and emptying of the trucks was in the early-2000s.

### 3.1.3 Mt. Defensa Avenue Drainage Ditch

As described in **Section 2.2.3**, the Mt. Defensa Avenue Drainage Ditch flows west to east through the VA property, into FTWHH along Mt. Defensa Avenue, and offsite by the Main Gate on Williams Street. Prior to 2016, little to no infiltration occurred within the Mt. Defensa Avenue Drainage Ditch due to the high velocity flow during snow melt and high intensity rain events. The ditch was reconfigured with large retention areas in 2016, slowing stormwater flow through the ditch. Information obtained during the PA indicated potential PFAS releases to soil have occurred along the Mt. Defensa Avenue Drainage Ditch from MTARNG activities onsite, as well as VA fire department activities upgradient of the facility. In February 2012, a rapid snowmelt event caused water to run vigorously through the drainage ditch. The vigorous movement of the water caused foaming in the drainage ditch that ran offsite to the retention pond just outside the main gate of the facility. The cause of the foaming is unknown; however, potential PFAS releases in and around the drainage ditch were noted by interviewees. Therefore, it is possible that the cause of the foaming is residual PFAS from training activities.

The Mt. Defensa Avenue Drainage Ditch runs from west to east through the VA property adjacent to FTWHH, along Mt. Defensa Avenue, and offsite by the Main Gate. Precipitation, snow melt, and other surface runoff on the VA property and much of the Cantonment Area is captured in the Mt. Defensa Avenue Drainage Ditch, which flows to the Main Gate on Williams Street. Just outside the main gate there is a culvert that discharges stormwater across Williams Street between the MTARNG property and residential properties. During rapid snow melt or high intensity rain events, runoff is channelized and flows through the ditch and Cantonment Area discharging just outside the main gate between the MacDonald Property and the residential properties. Surface water runoff that reaches the area between the MacDonald Property and residential properties dissipates and infiltrates the subsurface and may reach groundwater.

### 3.1.4 MTARNG 1049th Firefighting Training Area 1 and 3

After the first SI mobilization was completed, two firefighting training areas (FTAs) were identified in AOI 1. The 1049th trained with foam in the Navy Parking Lot north of AOI1-MW1 (MTARNG 1049th Firefighting Training Area 1) and in the channel area east of AOI1-MW2 before the channel was excavated (MTARNG 1049th Firefighting Training Area 3). Specific details regarding the frequency, volume, chemical composition, and concentration of any potential AFFF used at either FTA are not known.

## 3.2 AOI 2

AOI 2 consists of four potential PFAS release areas as described below, the Excavated Soil from Mt. Defensa Avenue Drainage Ditch. Former Weasel Barn, MTARNG 1049th Engineer Detachment (Building M1), and MTARNG 1049th Firefighting Training Area 4.



### 3.2.1 Excavated Soil from Mt. Defensa Avenue Drainage Ditch

Due to flooding of the Mt. Defensa Avenue Drainage Ditch during rapid snowmelt and large rainfall events, the central portion of the ditch within the FTWHH boundary was widened in 2016 by excavating soil from the ditch. Based on the potential PFAS releases to this ditch, this soil is potentially contaminated with PFAS and was used to create a military vehicle staging area onsite near a retention pond in the northeast section of the Cantonment Area.

### 3.2.2 Former Weasel Barn

The Former Weasel Barn located in the northeast section of the Cantonment Area, north of Sanananda Drive, was demolished in the winter of 2002 as part of a live-burn fire training exercise. The Former Weasel Barn housed the Weasel, a tracked vehicle designed for operations in Arctic environments. The MTARNG 1049th burned the structure, and the MTARNG 1049th Team Chief recalled using AFFF to extinguish the fire. No information was available on the volume, chemical composition, or concentration of AFFF used during the event.

### 3.2.3 MTARNG 1049th Engineer Detachment (Building M1)

Prior to 1995, the MTARNG 1049th Engineer Detachment operated out of the former Post Engineers Maintenance Shop (Building M1), near the Field Maintenance Shop #3, at the southeast corner of Williams Street and Barrett Road in the 1980s. Although Building M1 is located outside the boundary of FTWHH, the property is controlled by MTARNG. AFFF storage and truck operations are described in **Section 3.1.2**. During fire training exercises, the majority of AFFF added to the trucks was expended. The trucks were washed, and residual AFFF was discharged with the wash water and allowed to dissipate on the ground at Building M1 in the late-1980s.

### 3.2.4 MTARNG 1049th Firefighting Training Area 4

After the first SI mobilization was completed, one additional FTA was identified in AOI 2. The 1049th trained with foam in the parking lot south of MW-08. Specific details regarding the frequency, volume, chemical composition, and concentration of any potential AFFF used at the FTA are not known.

## 3.3 AOI 3

AOI 3 consists of three potential PFAS release areas as described below, the Planned Fire Structure, Burial Trench, and MTARNG 1049th Firefighting Training Area 2.

### 3.3.1 Planned Fire Structure

A structure was burned and used as a live-fire training exercise in the northwest portion of the Cantonment Area near the current Dining Facility (Building 410). The MTARNG 1049th Team Chief recalled using AFFF to extinguish this structure fire. Based on aerial photography, the structure was burned sometime between 1995 and 2002. Specific details regarding the frequency, volume, chemical composition, and concentration of the AFFF used during the exercise is not known.

### 3.3.2 Burial Trench

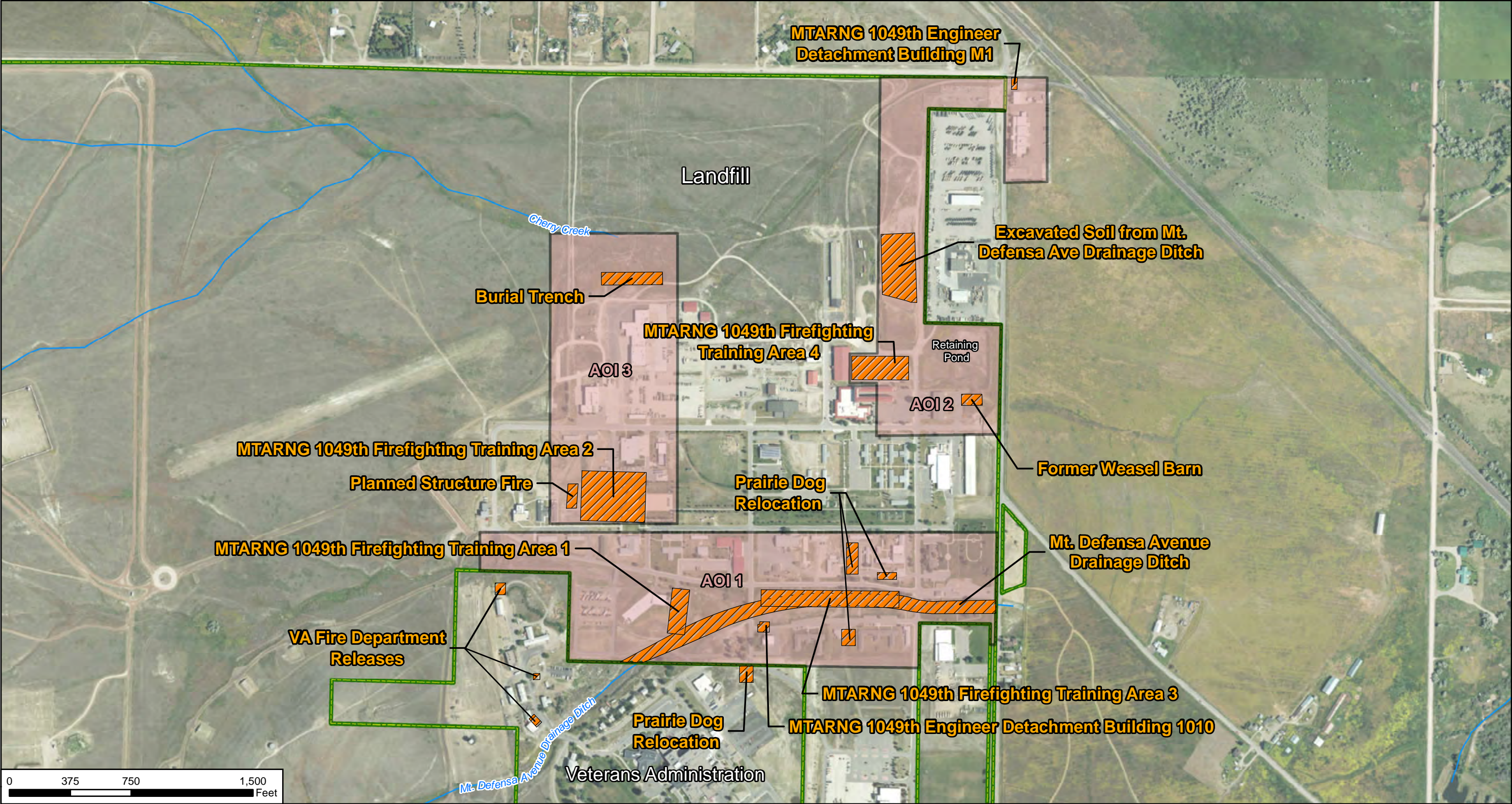
Prior to 1987, an area approximately 200 feet north of Colle Ferro Avenue in the northwest section of the Cantonment Area was used to dig a burial trench and dispose of debris and ordnance. One MTARNG retiree indicated that vehicles were placed in the burial trench, burned, and

extinguished with AFFF by MTARNG Firefighters. This use of AFFF could not be confirmed by any other interviewees during the PA, and no information was available on the volume, chemical composition, and concentration of the potential AFFF released. The Combined Support Maintenance Shop was constructed due south of the burial trench in 1987.

### 3.3.3 MTARNG 1049th Firefighting Training Area 2

After the first SI mobilization was completed, one additional FTA was identified in AOI 3. The 1049th trained with foam near the former location of Building 410 (Planned Fire Structure). Specific details regarding the frequency, volume, chemical composition, and concentration of any potential AFFF used at the FTA are not known.





CLIENT ARNG					<div><div></div>Area of Interest</div> <div><div></div>Potential PFAS Release</div> <div><div></div>Facility Boundary</div> <div><div></div>River/Stream</div>	<div>N</div> <div></div>	Areas of Interest	
PROJECT Site Inspection for PFAS at Fort William Henry Harrison, MT							<div><div>AECOM</div><div>12420 Milestone Center Drive Germantown, MD 20876</div></div> <div>Figure 3-1</div>	
REVISED	6/7/2021	GIS BY	MS	6/7/2021				
SCALE	1:7,200	CHK BY	JH	6/7/2021				
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community				PM				

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## 4. Project Data Quality Objectives

Project Data Quality Objectives (DQOs) are qualitative and quantitative statements that specify the quality of data and define the level of certainty required to support the project decision-making process. The specific DQOs established for this facility are described below. These DQOs were developed in accordance with the USEPA's seven-step iterative process (USEPA, 2006).

### 4.1 Problem Statement

The following problem statement was developed during project planning:

The presence of PFAS, which may pose a risk to human health or the environment, in environmental media at the facility is currently unknown. PFAS are classified as emerging environmental contaminants that are garnering increasing regulatory interest due to their potential risks to human health and the environment. The regulatory framework for managing PFAS at both the federal and state level continues to evolve.

The DoD has adopted a policy to retain facilities in the CERCLA process based on risk-based SLs for soil and groundwater, as described in a memorandum from the Office of the Secretary of Defense (OSD) dated 15 October 2019 (Assistant Secretary of Defense, 2019). The ARNG program under which this SI was performed follows this DoD policy. Should the maximum site concentration for sampled media exceed the SLs established in the OSD memorandum, the AOI will proceed to the next phase under CERCLA. The SLs established in the OSD memorandum apply to three compounds: PFOS, PFOA, and PFBS. The SLs are presented in **Section 6.1** of this Report.

The following quotes from the DA policy documents form the basis for this project (DA, 2016; DA, 2018):

- “The Army will research and identify locations where PFOS- and/or PFOA-containing products, such as AFFF, are known or suspected to have been used. Installations shall coordinate with installation/facility fire response or training offices to identify AFFF use or storage locations. The Army will consider FTAs, AFFF storage locations, hangars/buildings with AFFF suppression systems, fire equipment maintenance areas, and areas where emergency response operations required AFFF use as possible source areas. In addition, metal plating operations, which used certain PFOS-containing mist suppressants, shall be considered possible source areas.”
- “Based on a review of site records...determine whether a CERCLA PA is appropriate for identifying PFOS/PFOA release sites. If the PA determines a PFOS/PFOA release may have occurred, a CERCLA SI shall be conducted to determine presence/absence of contamination.”
- “Identify sites where perfluorinated compounds are known or suspected to have been released, with the priority being those sites within 20 miles of the public systems that tested above USEPA HA levels” (USEPA, 2016a; USEPA, 2016b).

### 4.2 Goals of the Study

The following goals were established for this SI:

- 1) Determine the presence or absence of PFOA, PFOS, and PFBS at or above SLs.
- 2) Develop information to potentially eliminate a release from further consideration because it is determined that it poses no significant threat to human health or the environment.
- 3) Determine the potential need for a removal action.

- 4) Collect data to better characterize the release areas for more effective and rapid initiation of an RI.
- 5) Identify within 4 miles of the installation other potential PFAS sources (fire stations, major manufacturers, other DoD facilities) and receptors, including both groundwater and surface water receptors, to determine whether the ARNG is the likely source of PFAS, or whether there is an off- facility source of PFAS responsible for installation detections of PFAS (USEPA, 2005).
- 6) Determine whether a potentially complete pathway exists between the source and potential receptors and whether ARNG is the likely source of the contamination.

## 4.3 Information Inputs

Primary information inputs included:

- PA for FTWHH, Montana (AECOM, 2018c)
- Groundwater and soil samples collected in accordance with the Site Specific Uniform Federal Policy (UFP)-Quality Assurance Project Plan (QAPP) Addendum (AECOM, 2019)
- Field data collected during the two SI mobilizations, including groundwater elevation and water quality parameters measured at the time of sampling.

## 4.4 Study Boundaries

The scope of the SI sampling approach was bounded by the property limits of the facility (**Figure 2-1**). Offsite sampling was not included in the scope of this SI; however, residential drinking water sampling was performed downgradient of FTWHH to determine if a complete drinking water pathways exists.

## 4.5 Analytical Approach

Samples were analyzed by Gulf Coast Analytical Laboratories, LLC (GCAL) during the first SI mobilization and Pace Analytical Gulf Coast during the second SI mobilization (GCAL acquired by Pace). The lab is accredited under the DoD Environmental Laboratory Accreditation Program (DoD ELAP; Accreditation Number 74960) and the National Environmental Laboratory Accreditation Program (NELAP; Certificate Number 01955). Data were compared to applicable SLs and decision rules as defined in the SI QAPP Addendum (AECOM, 2019). These rules governed response actions based on the results of the SI sampling effort.

The decision rules described in the **Worksheet #11** of the SI QAPP Addendum identify actions based on the following:

### Groundwater:

- Is there a human receptor within 4 miles of the site?
- What is the concentration of PFOA, PFOS, and PFBS at the potential release area?
- What is the concentration of PFOA, PFOS, and PFBS at the facility boundary upgradient and downgradient of the potential release areas?
- What does the conceptual site model (CSM) suggest in terms of source, pathway and receptor?

### Soil:

- What is the concentration of PFOA, PFOS, and PFBS in shallow surface soil (0 to 2 feet bgs)?
- What is the concentration of PFOA, PFOS, and PFBS constituents in deep soil (15 to 42 feet bgs) (i.e., capillary fringe)?
- What does the CSM suggest in terms of source, pathway, and receptor?

Soil and groundwater samples were collected from each of the potential release areas. Groundwater was encountered at approximately 14 to 49 feet bgs.

## 4.6 Data Usability Assessment

The Data Usability Assessment (DUA) is an evaluation at the conclusion of data collection activities that uses the results of both data verification and validation in the context of the overall project decisions or objectives. Using both quantitative and qualitative methods, the assessment determines whether project execution and the resulting data have met installation-specific DQOs. Both sampling and analytical activities are considered to assess whether the collected data are of the right type, quality, and quantity to support the decision-making (DoD, 2018a; DoD, 2018b; USEPA, 2017).

Data quality indicators (DQIs) (Precision, Accuracy, Representativeness, Comparability, Completeness and Sensitivity) are important components in assessing data usability. These DQIs were evaluated in the subsequent sections and demonstrate that the data presented in this SI report are of high quality. Although the SI data are considered reliable, some degree of uncertainty can be associated with the data collected. Specific factors that may contribute to the uncertainty of the data evaluation are described below. The Data Validation Report (**Appendix A**) presents explanations for all qualified data in greater detail.

### 4.6.1 Precision

Precision is the degree of agreement among repeated measurements of the same characteristic on the same sample or on separate samples collected as close as possible in time and place. Field sampling precision is measured with the field duplicate relative percent differences (RPD); laboratory precision is measured with calibration verification, internal standard recoveries, laboratory control spike (LCS) and matrix spike (MS) duplicate RPD.

Injection internal standards were added by the laboratory during sample injection to measure relative responses of target analytes and used to correct for bias associated with interference or losses during injection. Field sample AOI2-HA2-0-2 displayed injection internal standard area counts less than the lower quality control (QC) limit of 50% for M2PFDA, M2PFHxA, M2PFOA, and M4PFOS. The associated field sample results were positive and were qualified “J+”. These anomalies are considered minor, and the results are usable as qualified but should be considered as estimated values with a positive bias.

Extraction internal standards were added by the laboratory during sample extraction to measure relative responses of target analytes and used to correct for bias associated with matrix interferences and sample preparation efficiencies, injection volume variances, mass spectrometry ionization efficiencies, and other associated preparation and analytical anomalies. Several field samples displayed extraction internal standard percent recoveries associated with multiple analytes that were outside the QC limits. The positive field sample results associated with low extracted internal standard (EIS) percent recoveries were qualified “J+”, while those associated with high EIS percent recoveries were qualified “J-”. The non-detect field sample results associated with EIS percent recoveries outside the QC limits were qualified “UJ”. These

anomalies are considered minor, and the results are usable as qualified but should be considered as an estimated value.

Calibration verifications were performed routinely to ensure that instrument responses for all calibrated analytes were within established QC criteria. All calibration verifications were within the project established precision limits presented in the SI QAPP Addendum (AECOM, 2019).

LCS/LCS duplicate (LCSD) pairs were prepared by addition of known concentrations of each analyte in a matrix-free media known to be free of target analytes. LCS/LCSD pairs were analyzed for every analytical batch to demonstrate the ability of the laboratory to detect similar concentrations of a known quantity in matrix-free media. The LCS/LCSD pairs were within the project established precision limits presented in the SI QAPP Addendum (AECOM, 2019).

MS/MS duplicate (MSD) samples were prepared, analyzed, and reported for all preparation batches. MS/MSD samples demonstrated that the analytical system was in control for the matrix being tested. MS/MSD samples were submitted to the laboratory for analysis at a rate of 5%. The MS/MSD pairs were within the project established precision limits presented in the SI QAPP Addendum (AECOM, 2019).

Field duplicate samples were collected at a rate of 10% to assess the overall sampling and measurement precision for this sampling effort. The field duplicate samples were analyzed for PFAS and general chemistry parameters. The field duplicate samples were within the project established precision limits presented in the SI QAPP Addendum (AECOM, 2019).

#### 4.6.2 Accuracy

Accuracy is a measure of confidence in a measurement. The smaller the difference between the measurement of a parameter and its "true" or expected value, the more accurate the measurement. The more precise or reproducible the result, the more reliable or accurate the result. Accuracy is measured through percent recoveries in the LCS/LCSD, MS/MSD, and surrogates.

LCS/LCSD samples were prepared by addition of known concentrations of each analyte in a matrix free media known to be free of target analytes. LCS/LCSD samples were analyzed for every analytical batch and demonstrated that the analytical system was in control during sample preparation and analysis, with one exception. The LCS/LCSD prepared in QC batch 661091 displayed a percent recovery for perfluorotridecanoic acid (PFTTrDA) greater than the upper QC limit of 130% at 149% in the LCS and 154% in the LCSD. The associated field sample results were non-detect; no data qualifying action was required.

MS/MSD samples were prepared, analyzed, and reported at a rate of 5%. MS/MSD samples demonstrated that the analytical system was in control for the matrix being tested, with one exception. The MS/MSD performed on parent sample AOI2-SS4-0-2 displayed a percent recovery for PFOS greater than the upper QC limit of 130% at 187% in the MS. The parent sample result was positive and was qualified "J+". This anomaly is considered minor, and the result is usable as qualified but should be considered as an estimated value with a positive bias. The MS/MSD performed on parent sample AOI2-MW1 displayed MSD percent recoveries less than the lower QC limit of 70% for perfluorohexanesulfonic acid (PFHxS) and perfluorohexanoic acid (PFHxA) at 61% and 68%, respectively. The parent sample results were positive and were flagged "J-". These anomalies are considered minor, and the results are usable as qualified but should be considered as estimated values with a positive bias. The MS/MSD performed on parent sample AOI1-MW3-GW displayed percent recoveries greater than the upper QC limit for PFHxS at 133% in the MS and 140% in the MSD. The associated parent sample and field duplicate results were positive and were qualified "J+".



### 4.6.3 Representativeness

Representativeness qualitatively expresses the degree to which data accurately reflect site conditions. Factors that affect the representativeness of analytical data include appropriate sample population definitions, proper sample collection and preservation techniques, analytical holding times, use of standard analytical methods, and determination of matrix or analyte interferences.

Relating to the use of standard analytical methods, the laboratory followed the method as established in PFAS via liquid chromatography with tandem mass spectrometry (LC/MS/MS) compliant with DoD Quality Systems Manual (QSM) 5.1 Table B-15, including the specific preparation requirements (i.e. ENVI-Carb or equivalent used), mass calibration, spectra, all the ion transitions identified in Table B-15 were monitored, standards that contained both branch and linear isomers when available were used, and isotopically labeled standards were used for quantitation.

Field QC samples were collected to assess the representativeness of the data collected. Field duplicates were collected at a rate of 10% for all field samples, while MS/MSD samples were collected at a rate of 5%. Field sample FH-02-101120 was re-extracted and reanalyzed outside of holding time due to an EIS anomaly. The re-extracted results were qualified "J" and are recommended to be retained within the data set. Several soil samples were submitted for pH analysis. The technical holding time for pH analysis is "immediate"; the associated results were qualified "J". All preservation techniques were followed by the field staff, and all technical and analytical holding times were met by the laboratory. The laboratory used approved standard methods in accordance with the SI QAPP Addendum (AECOM, 2019) for all analyses.

Instrument blanks and method blanks were prepared by the laboratory in each batch as a negative control. Several PFAS instrument blanks and method blanks displayed detections greater than the detection limit for multiple target analytes. In total, 110 field sample results were qualified "U" during data validation due to associated detections in instrument and/or method blanks. The reported field sample result values were adjusted to be equal to the level of detection (LOD); the LOD was elevated to the concentration of the blank detection in instances where the blank concentration was greater than the LOD. The results are usable as qualified but should be considered false positives and treated as non-detect.

Equipment blanks and field blanks were also collected for groundwater and soil samples. Equipment blank AOI-MW3-EB displayed a detection greater than the detection limit for perfluorobutanoic acid (PFBA) at 16.5 ng/L. The positive associated field sample results were greater than five times the concentration in the equipment blank; therefore, no data qualifying action was required. The field blank sample FIELD BLANK displayed a detection greater than the detection limit for PFOS at 1.62 ng/L. The field blank result was associated with an instrument blank detection within five times the blank concentration and was qualified "U". The qualified field blank result should be considered as false positive and treated as non-detect; no data qualifying action was taken based on the qualified field blank result. Equipment blank FTWHH-ERB-03 in QC batch 695178 displayed concentrations greater than the detection limit for 6:2 fluorotelomer sulfonate (6:2 FTS). The field sample results associated with the equipment blank were either non-detect, or previously qualified due to a method blank contamination; no further data qualifying action was required. The field blank FTWHH-FRB in QC batch 695178, displayed concentrations greater than the detection limit for 6:2 FTS. The associated field sample results were greater than five times the concentration found in the blank detection; no data qualifying action was required.

A sample of the water used for decontamination of the drill rig was collected in advance of the field effort. The drill rig decontamination sample FTWHH-DECON displayed non-detect results for all target analytes. Based on the sample results, the potable water source was deemed acceptable for use during the investigation for decontamination of drilling equipment and during well installation.

Overall, the data are usable for evaluating the presence or absence of PFAS at the facility. Sufficient usable data were obtained to meet the objectives of the SI and to complete the risk assessment.

#### 4.6.4 Comparability

Comparability is the extent to which data from one study can be compared directly to either past data from the current project or data from another study. Using standardized sampling and analytical methods, units of reporting, and site selection procedures help ensure comparability. Standard field sampling and typical laboratory protocols were used during the SI and are considered comparable to ongoing investigations.

#### 4.6.5 Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount of data expected under normal conditions. The laboratory provided data meeting system QC acceptance criteria for all samples tested. Project completeness was determined by evaluating the planned versus actual quantities of data. Percent completeness per parameter is as follows:

- PFAS in groundwater via LC/MS/MS compliant with QSM 5.1 Table B-15 at 100%
- PFAS in soil via LC/MS/MS compliant with DoD QSM 5.1 Table B-15 at 100%
- pH in soil by USEPA Method 9045D at 100%
- Total organic carbon (TOC) by USEPA Method 9060 at 100%

#### 4.6.6 Sensitivity

Sensitivity is the capability of a test method or instrument to discriminate between measurement responses representing different levels (e.g., concentrations) of a variable of interest. Examples of QC measures for determining sensitivity include laboratory fortified blanks, a method detection limit (MDL) study, and calibration standards at the level of quantitation (LOQ). In order to meet the needs of the data users, project data must meet the measurement performance criteria for sensitivity and project LOQs specified in the SI QAPP Addendum (AECOM, 2019). The laboratory provided the requested MDL studies and provided applicable calibration standards at the LOQ. In order to achieve the DQOs for sensitivity outlined in the SI QAPP Addendum (AECOM, 2019), the laboratory reported all field sample results at the lowest possible dilution. Additionally, any analytes detected below the LOQ and above the MDL were reported and qualified “J” as estimated values by the laboratory.

## 5. Site Inspection Activities

This section describes the environmental investigation and sampling activities that occurred as part of the SI. The SI sampling approach was based on the findings of the PA and implemented in accordance with the following approved documents.

- *Final Site Inspection Programmatic Uniform Federal Policy-Quality Assurance Project Plan* dated March 2018 (AECOM, 2018a)
- *Final Programmatic Accident Prevention Plan* dated July 2018 (AECOM, 2018b)
- *Final Preliminary Assessment Report, Fort William Henry Harrison, Montana* dated August 2018 (AECOM, 2018c)
- *Final Site Safety and Health Plan, Fort William Henry Harrison, Montana* dated October 2018 (AECOM, 2018d)
- *Final Site Inspection Uniform Federal Policy-Quality Assurance Project Plan Addendum, Fort William Henry Harrison, Montana* dated January 2019 (AECOM, 2019)
- *Final Supplemental Site Inspection Uniform Federal Policy-Quality Assurance Project Plan Addendum, Fort William Henry Harrison, Montana* dated October 2020 (AECOM, 2020)

SI field activities were conducted in two mobilizations. The first mobilization included permanent groundwater monitoring well installation, development, and sampling; surface and subsurface soil sampling; and groundwater sampling from existing wells from 10 to 20 February 2019 and from 19 to 31 May 2019. The second mobilization included permanent groundwater monitoring well installation, development, and sampling; surface and subsurface soil sampling; and groundwater sampling from existing wells from 5 to 15 October 2020. Field activities were conducted in accordance with the SI QAPP Addendum and Supplemental SI QAPP Addendum (AECOM, 2019; AECOM, 2020), except as noted in **Section 5.9**.

To fulfill the project DQOs set forth in the approved the SI QAPP Addendum and Supplemental SI QAPP Addendum (AECOM, 2019; AECOM, 2020), samples were collected and analyzed for a subset of 18 PFAS by LC/MS/MS compliant with QSM 5.1 Table B-15 to fulfill the project DQOs:

### Mobilization 1 –

- 47 soil grab samples from 27 boring locations; and
- 15 groundwater samples, six from new monitoring well locations, eight from existing monitoring well locations, and one from an irrigation well location.

### Mobilization 2 –

- 30 soil grab samples from 27 boring locations; and
- 15 groundwater samples, five from new monitoring well locations and ten from existing monitoring well locations.

**Figures 5-1** and **5-2** provide the sample locations for all media across the facility for Mobilization 1 and 2, respectively. **Table 5-1** presents all samples collected for each media during Mobilization 1 and 2, respectively. Daily reports were completed throughout both SI activities, which are provided in **Appendix B1**. Additionally, a photographic log of field activities is provided in **Appendix C**.

## 5.1 Pre-Investigation Activities

In preparation for the SI field activities, project team members participated in a Technical Project Planning (TPP) meeting, performed utility clearance, and sampled decontamination source water, each of which is discussed in more detail below.

### 5.1.1 Technical Project Planning

The USACE TPP Process, EM 200-1-2 (USACE, 2016) defines four phases to project planning: 1.) defining the project phase; 2.) determining data needs; 3.) developing data collection strategies; and 4.) finalizing the data collection plan. The process encourages stakeholder involvement in the SI, beginning with defining overall project objectives, including quantitative and qualitative DQOs, and formulating a sampling approach to address the AOIs identified in the PA.

TPP Meeting 1 and 2 for Mobilization 1 were held on 8 November 2018, prior to SI field activities. Meeting minutes are provided in **Appendix D**. TPP meetings 1 and 2 were conducted in general accordance with EM 200-1-2 (USACE, 2016).

The stakeholders for this SI include the ARNG, MTARNG, USACE, MTDEQ, and the VA, and they were provided the opportunity to make comments on the technical sampling approach and methods in the TPP 2 meeting. The outcome of TPP meetings 1 and 2 were memorialized in the SI QAPP Addendum (AECOM, 2019). Future TPP meetings will provide an opportunity to discuss the results and findings, and future actions, where warranted.

No formal TPP Meeting 1 and 2 was held for Mobilization 2 given the scope followed many of the same procedures outlined in the SI QAPP Addendum. However, a call was held on 22 September 2020 with the stakeholders (ARNG, MTARNG, USACE, and MTDEQ) to discuss the proposed sampling locations and MTDEQ comments on the Supplemental SI QAPP, which were provided before the call.

### 5.1.2 Utility Clearance

Utility clearance was conducted by Montana811 and facilitated by MTARNG. MTARNG contacted Montana811 one-call utility clearance contractor to notify them of intrusive work. AECOM field staff were onsite during the utility locate. Additionally, the first 5 feet of each boring were advanced using an air knife and hand augering to verify utility clearance in shallow subsurface where utilities would typically be encountered.

### 5.1.3 Source Water and PFAS Sampling Equipment Acceptability

A sample from a local potable water source at FTWHH was collected on 8 September 2018, prior to Mobilization 1, and analyzed for PFAS via LC/MS/MS compliant with DoD QSM 5.1 Table B-15. The potable water source at FTWHH is supplied by the City of Helena. The results of the potable well sample are provided in **Appendix G**. A discussion of the results is presented in **Section 4.6.3**. The same water source was used during Mobilization 2.

All materials that were used within the sampling zone were confirmed as acceptable for use in the PFAS sampling environment. The checklist of acceptable materials for use in the PFAS sampling environment is provided in PQAPP Appendix C, Table 1 (AECOM, 2018a). Prior to the start of field work each day, a PFAS Sampling Checklist was completed as an additional layer of control. The checklist served as a daily reminder to each field team member regarding the allowable materials within the sampling environment.

## 5.2 Soil Borings and Soil Sampling

Soil borings and sampling were performed during both Mobilization 1 and 2. During Mobilization 1, soil samples were collected from boreholes drilled by one of three methods: 1) air knifing, 2) hand augering, or 3) rotosonic drilling. In February 2019, when the ground was frozen, the surface soil and shallow subsurface samples were collected using an air knife, and in May 2019, during warmer weather, surface and shallow subsurface samples were collected with a hand auger. Deep subsurface soil samples collected from well borings were collected using a Boart Longyear LS250 minisonic drill rig. Three discrete soil samples were collected from the sonic well borings: the first from 0 to 2 feet bgs, the second from the mid-point between the surface and the groundwater table, and the third from approximately 1 foot above the groundwater table. The Mobilization 1 and 2 SI boring locations are shown on **Figure 5-1**, Mobilization 2 SI boring locations are shown on **Figure 5-2**, and boring depths for both mobilizations are provided **Table 5-1**. The soil boring locations were selected based on the AOI information as agreed on through TPP and SI QAPP Addendum review.

During Mobilization 2, soil samples were collected from boreholes drilled by one of three methods: 1) air knifing, 2) hand augering, or 3) hollow stem auger (HSA). Surface and shallow subsurface soil samples were collected as described during Mobilization 1. Deep subsurface soil samples were collected from well borings using a CME-75 HSA rig with 18-inch split-spoons.

The soil cores were logged for lithological descriptions by a field geologist using the Unified Soil Classification System (USCS). A photoionization detector (PID) was used to screen the breathing zone during boring activities as part of personal safety requirements. Observations and measurements were recorded on sampling forms (**Appendix B2**) and in a non-treated field logbook (i.e., composition notebook). Depth interval, recovery thickness, PID concentrations, moisture, relative density, color (using a Munsell soil color chart), and texture (using the USCS) were recorded. The boring logs are provided in **Appendix E**.

Each sample was collected into laboratory-supplied PFAS-free high-density polyethylene (HDPE) bottles and labeled using a PFAS-free marker or pen. Samples were packaged on ice and transported via Federal Express under standard chain-of-custody (COC) procedures to the laboratory and analyzed for PFAS via LC/MS/MS compliant with DoD QSM 5.1 Table B-15, TOC, (USEPA Method 9060A) and pH (USEPA Method 9045D) in accordance with the SI QAPP Addendum (AECOM, 2019). For cases in which non-dedicated sampling equipment was used, such as a stainless-steel scoop and mixing bowl used for the 0 to 2 feet bgs soil samples, equipment blank samples were collected and analyzed for the same parameters as the soil samples.

Field duplicate samples were collected at a rate of 10% and analyzed for the same parameters as the accompanying samples. MS/MSDs were collected at a rate of 5% and analyzed for the same parameters as the accompanying samples. A temperature blank was placed in each cooler to ensure that samples were preserved at or below 4 degrees Celsius (°C) during shipment.

## 5.3 Permanent Well Installation and Groundwater Sampling

Permanent monitoring wells were installed during both Mobilization 1 and 2. Six permanent groundwater monitoring wells were installed during Mobilization 1, and five were installed during Mobilization 2. The wells were installed at locations within or downgradient of potential PFAS release areas. Additionally, the new well locations assisted with the understanding of groundwater flow direction at the facility.

Boreholes were advanced using the drilling methods described above and used to install 2-inch diameter monitoring wells. The monitoring wells were constructed with Schedule 40 polyvinyl chloride (PVC), flush threaded 10-foot sections of riser, 0.010-inch slotted well screen, and a



threaded bottom cap. A filter pack of 20/40 silica sand was installed in the annulus around the well screen to a minimum of 2-feet above the well screen. A 2-feet thick bentonite seal was placed above the filter sand and hydrated with distilled water. Bentonite grout was placed in the well annulus from the top of the bentonite seal to ground surface during Mobilization 1. Bentonite chips were used during Mobilization 2. The bentonite grout/chips were allowed to set for 24-hours prior to well completion in accordance with the SI QAPP Addendum and Supplemental SI QAPP Addendum (AECOM, 2019; AECOM, 2020). The screen interval of each of the groundwater monitoring wells installed during Mobilization 1 and 2 are provided in **Table 5-2**.

The newly installed monitoring wells were developed no sooner than 24 hours following installation by pumping and surging using a variable speed submersible pump. Development of wells was completed in accordance with the SI QAPP Addendum and Supplemental SI QAPP Addendum (AECOM, 2019; AECOM, 2020).

## 5.4 Groundwater Sampling from Existing Wells

Groundwater samples were collected from newly installed and existing monitoring wells during Mobilization 1 and 2. Samples from newly installed wells were collected no sooner than 24 hours following development. All samples were collected via low-flow sampling methods using a bladder pump (with a disposable polytetrafluoroethylene bladder) with disposable PFAS-free, HDPE tubing. New tubing and bladders were used at each well, and the pumps were decontaminated between each well. The wells were purged at a rate determined in the field to reduce draw down prior to sampling. Water quality parameters (e.g., temperature, specific conductance, pH, dissolved oxygen [DO], turbidity, and oxidation-reduction potential [ORP]) were measured using a water quality meter and recorded on the field sampling form (**Appendix B2**). Water levels were measured to the nearest 0.01 inch and recorded. Additionally, a subsample of each groundwater sample was collected in a separate container and a shaker test was completed to identify if there was any foaming. No foaming was noted in any of the groundwater samples. During Mobilization 1, the Pump House system was flushed and sampled for 15 minutes prior to collecting the groundwater sample. The location of wells sampled during Mobilization 1 are provided in **Figure 5-1**, Mobilization 2 in **Figure 5-2**, and the screen interval of each of the groundwater monitoring wells is provided in **Table 5-2**.

Each sample was collected into laboratory-supplied PFAS-free HDPE bottles and labeled using a PFAS-free marker or pen. Samples were packaged on ice, transported via Federal Express under standard COC procedures to the laboratory, and analyzed for PFAS in accordance with the SI QAPP Addendum and Supplemental SI QAPP Addendum (AECOM, 2019; AECOM, 2020).

Field duplicate samples were collected at a rate of 10% and analyzed for the same parameters as the accompanying samples. MS/MSD were collected at a rate of 5% and analyzed for the same parameters as the accompanying samples. FRBs accompanied each cooler containing samples for PFAS analysis and were analyzed for select PFAS. A temperature blank was placed in each cooler to ensure that samples were preserved at or below 4 °C during shipment.

## 5.5 Synoptic Water Level Measurements

A synoptic groundwater gauging event was performed on 30 May 2019 and 13 October 2020. Water level measurements were taken from the northern side of the well casing. A groundwater flow contour map is provided in **Figure 2-4** and **Figure 2-5**. Depth to water readings and calculated groundwater elevation data from both synoptic rounds are provided in **Table 5-3**.

## 5.6 Surveying

The northern side of each well casing was surveyed by Montana-Licensed land surveyor following guidelines provided in the standard operating procedures provided in the SI QAPP Addendum



and Supplemental SI QAPP Addendum (AECOM, 2019; AECOM, 2020). Survey data from the newly installed wells were collected on 24 July 2019 and 14 October 2020 in the Montana State Plane North American Datum of 1983 and North American Vertical Datum of 1988. The surveyed well data is provided in **Appendix B3**.

## 5.7 Investigation Derived Waste

Soil investigation-derived waste (IDW) (i.e., soil cuttings) and liquid IDW (purge and decontamination water) generated during the SI activities were containerized in 55-gallon drums for future disposal by ARNG. The soil and liquid IDW was not sampled and assumes the PFAS characteristics of the associated soil samples collected from that source location.

Other solids such as spent personal protective equipment (PPE), plastic sheeting, tubing, rope, unused monitoring well construction materials, and other environmental media generated during the field activities were disposed of at a licensed solid waste landfill.

## 5.8 Laboratory Analytical Methods

Samples were analyzed for PFAS via LC/MS/MS compliant with QSM 5.1 Table B-15 by GCAL/Pace Analytical Gulf Coast in Baton Rouge, Louisiana, a DoD ELAP and NELAP certified laboratory. The 18 PFAS analyzed as part of the ARNG SI program include the following:

- 6:2 fluorotelomer sulfonate (6:2 FTS)
- 8:2 fluorotelomer sulfonate (8:2 FTS)
- N-ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)
- N-methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)
- Perfluorobutyrate (PFBA)
- Perfluorobutanesulfonic acid (PFBS)
- Perfluorodecanoic acid (PFDA)
- Perfluorododecanoic acid (PFDoA)
- Perfluoroheptanoic acid (PFHpA)
- Perfluorohexanoic acid (PFHxA)
- Perfluorohexanesulfonic acid (PFHxS)
- Perfluorononanoic acid (PFNA)
- Perfluorooctanoic acid (PFOA)
- Perfluorooctanesulfonic acid (PFOS)
- Perfluoropentanoic acid (PFPeA)
- Perfluorotetradecanoic acid (PFTeDA)
- Perfluorotridecanoic acid (PFTrDA)
- Perfluoroundecanoic acid (PFUdA)

Soil samples were also analyzed for TOC using USEPA Method 9060A, and pH by USEPA Method 9045D.

## 5.9 Deviations from SI QAPP Addendum

Deviations from the SI QAPP Addendum and Supplemental SI QAPP Addendum occurred based on field conditions and discussion between AECOM and ARNG. Deviations from both mobilizations are noted below:

- During Mobilization 1, the SI QAPP Addendum indicated that groundwater would be sampled at nine existing wells. The USGS Well was only a PVC stickup location to measure water level and not a properly installed well location; therefore, a groundwater sample was not collected from this location.

- During Mobilization 2, two proposed sample locations within AOI 1 (AOI01-MW4 and AOI01-SS7) were within the Navy property boundary. The field team shifted these proposed locations to the east (on FTWHH property) and completed a Field Change Request for team approval before proceeding with sampling those locations. This has been included in **Appendix B4**.

**Table 5-1  
Samples by Medium  
Fort William Henry Harrison, MT  
Site Inspection Report**

Sample Identification	Sample Collection Date	Sample Depth (ft bgs)	PFAS (USEPA Method 537 Modified)	TOC (USEPA Method 9060A)	pH (USEPA Method 9045D)	Grain Size (ASTM D422)	Comments
<b>SI Soil Samples AOI 1</b>							
AOI1-SB1-0-2	2/13/2019	0-2	x	x	x		
AOI1-SB1-20-22	2/13/2019	20-22	x	x	x		MS/MSD
AOI1-SB1-38-40	2/13/2019	38-40	x	x	x		
AOI1-MW1-18-20	2/13/2019	18-20				x	
AOI1-MW1-50-55	2/13/2019	50-55				x	
AOI1-SB2-0-2	2/15/2019	0-2	x	x	x		
AOI1-SB2-15-17	2/15/2019	15-17	x	x	x		
AOI1-SB2-28-30	2/15/2019	28-30	x	x	x		
AOI1-MW2-35-37	2/15/2019	35-37				x	
AOI1-SB3-0-2	2/20/2019	0-2	x	x	x		
AOI1-SB3-18-20	2/20/2019	18-20	x	x	x		
AOI1-SB3-18-20-DUP	2/20/2019	18-20	x	x	x		Field Duplicate
AOI1-SB3-38-40	2/20/2019	38-40	x	x	x		
AOI1-MW3-47-48	2/20/2019	47-48				x	
AOI1-HA1-0-2	2/12/2019	0-2	x	x	x		
AOI1-HA1-2-4	2/12/2019	2-4	x	x	x		
AOI1-HA2-0-2	2/12/2019	0-2	x	x	x		
AOI1-HA2-2-4	2/12/2019	2-4	x	x	x		
AOI1-SS1-0-2	2/14/2019	0-2	x	x	x		
AOI1-SS1-0-2R	5/20/2019	0-2	x	x	x		
AOI1-SS2-0-2	2/14/2019	0-2	x	x	x		
AOI1-SS3-0-2	2/14/2019	0-2	x	x	x		MS/MSD
AOI1-SS4-0-2	2/14/2019	0-2	x	x	x		
AOI1-SS5-0-2	2/14/2019	0-2	x	x	x		
AOI1-SS6-0-2	2/20/2019	0-2	x	x	x		
<b>SSI Soil Samples AOI 1</b>							
AOI01-04-SB-00-02	10/7/2020	0-2	x				
AOI01-04-SB-15-17	10/9/2020	15-17	x				
AOI01-04-SB-30-32	10/9/2020	30-32	x	x	x		
AOI01-05-SB-00-02	10/6/2020	0-2	x				
AOI01-05-SB-15-17	10/8/2020	15-17	x	x	x		
AOI01-05-SB-15-17-DUP	10/8/2020	15-17		x	x		Field Duplicate
AOI01-05-SB-15-17-MS	10/8/2020	15-17		x	x		MS
AOI01-05-SB-15-17-MSD	10/8/2020	15-17		x	x		MSD
AOI01-05-SB-30-32	10/8/2020	30-32	x				
AOI01-06-SB-00-02	10/6/2020	0-2	x				
AOI01-06-SB-15-17	10/9/2020	15-17	x				
AOI01-06-SB-30-32	10/9/2020	30-32	x				
AOI01-SS7-00-02	10/7/2020	0-2	x				
AOI01-SS8-00-02	10/6/2020	0-2	x				
AOI01-SS9-00-02	10/6/2020	0-2	x				
AOI01-SS10-00-02	10/6/2020	0-2	x				
AOI01-SS11-00-02	10/7/2020	0-2	x				
AOI01-SS12-00-02	10/7/2020	0-2	x				
AOI01-SS13-00-02	10/7/2020	0-2	x				
AOI01-SS14-00-02	10/7/2020	0-2	x				
AOI01-SS15-00-02	10/7/2020	0-2	x				
<b>SI Soil Samples AOI 2</b>							
AOI2-SB1-0-2	5/21/2019	0-2	x	x	x		
AOI2-SB1-9-11	5/21/2019	9-11	x	x	x		
AOI2-SB1-18-20	5/21/2019	18-20	x	x	x		
AOI2-SB2-0-2	5/23/2019	0-2	x	x	x		
AOI2-SB2-0-2-DUP	5/21/2019	0-2	x	x	x		Field Duplicate
AOI2-SB2-8-10	5/23/2019	8-10	x	x	x		
AOI2-SB2-18-20	5/23/2019	18-20	x	x	x		
AOI2-HA1-0-2	2/13/2019	0-2	x	x	x		
AOI2-HA1-2-4	2/13/2019	2-4	x	x	x		
AOI2-HA2-0-2	2/13/2019	0-2	x	x	x		MS/MSD
AOI2-HA2-2-4	2/13/2019	2-4	x	x	x		
AOI2-HA2-2-4-DUP	2/13/2019	2-4	x	x	x		Field Duplicate

**Table 5-1  
Samples by Medium  
Fort William Henry Harrison, MT  
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Sample Identification	Sample Collection Date	Sample Depth (ft bgs)	PFAS (USEPA Method 537 Modified)	TOC (USEPA Method 9060A)	pH (USEPA Method 9045D)	Grain Size (ASTM D422)	Comments
AOI2-HA3-0-2	2/13/2019	0-2	x	x	x		
AOI2-HA3-2-4	2/13/2019	2-4	x	x	x		
AOI2-HA4-0-2	2/13/2019	0-2	x	x	x		
AOI2-HA4-2-4	2/13/2019	2-4	x	x	x		
AOI2-HA5-0-2	2/13/2019	0-2	x	x	x		
AOI2-HA5-2-4	2/13/2019	2-4	x	x	x		
AOI2-HA6-0-2	2/12/2019	0-2	x	x	x		
AOI2-HA6-2-4	2/12/2019	2-4	x	x	x		
AOI2-HA6-2-4-DUP	2/12/2019	2-4	x	x	x		Field Duplicate
AOI2-SS1-0-2	5/20/2019	0-2	x	x	x		
AOI2-SS2-0-2	5/20/2019	0-2	x	x	x		
AOI2-SS2-0-2-DUP	5/20/2019	0-2	x	x	x		Field Duplicate
AOI2-SS3-0-2	5/20/2019	0-2	x	x	x		
AOI2-SS4-0-2	5/20/2019	0-2	x	x	x		MS/MSD
AOI2-SS5-0-2	5/20/2019	0-2	x	x	x		
<b>SSI Soil Samples AOI 2</b>							
AOI02-03-SB-00-02	10/6/2020	0-2	x	x	x		
AOI02-03-SB-00-02-DUP	10/6/2020	0-2	x				Field Duplicate
AOI02-03-SB-00-02-MS	10/6/2020	0-2	x				MS
AOI02-03-SB-00-02-MSD	10/6/2020	0-2	x				MSD
AOI02-03-SB-10-12	10/10/2020	10-12	x				
AOI02-03-SB-10-12-DUP	10/10/2020	10-12	x				Field Duplicate
AOI02-03-SB-25-27	10/10/2020	25-27	x				
AOI02-SS6-00-02	10/6/2020	0-2	x				
AOI02-SS7-00-02	10/6/2020	0-2	x				
AOI02-SS8-00-02	10/6/2020	0-2	x				
<b>SI Soil Samples AOI 3</b>							
AOI3-SB1-0-2	5/22/2019	0-2	x	x	x		
AOI3-SB1-18-20	5/22/2019	18-20	x	x	x		
AOI3-SB1-40-42	5/22/2019	40-42	x	x	x		
AOI3-HA1-0-2	2/12/2019	0-2	x	x	x		
AOI3-HA1-0-4	2/12/2019	2-4	x	x	x		
<b>SSI Soil Samples AOI 3</b>							
AOI03-02-SB-00-02	10/6/2020	0-2	x				
AOI03-SS1-00-02	10/7/2020	0-2	x				
AOI03-SS2-00-02	10/7/2020	0-2	x				
AOI03-SS3-00-02	10/7/2020	0-2	x				
AOI03-SS4-00-02	10/7/2020	0-2	x				
AOI03-SS4-00-02-DUP	10/7/2020	0-2	x				Field Duplicate
AOI03-SS5-00-02	10/7/2020	0-2	x	x	x		
<b>SI Groundwater Samples</b>							
AOI1-MW1	5/28/2019	Mid-Screen	x				
AOI1-MW2	5/29/2019	Mid-Screen	x				
AOI1-MW2-DUP	5/29/2019	Mid-Screen	x				Field Duplicate
AOI1-MW3	5/25/2019	Mid-Screen	x				
BH-02	5/28/2019	Mid-Screen	x				
FH-02	5/28/2019	Mid-Screen	x				
AOI2-MW1	5/29/2019	Mid-Screen	x				
AOI2-MW2	5/30/2019	Mid-Screen	x				
MW-06	5/29/2019	Mid-Screen	x				
MW-06-DUP	5/29/2019	Mid-Screen	x				Field Duplicate
MW-07	5/30/2019	Mid-Screen	x				
MW-08	5/29/2019	Mid-Screen	x				
AOI3-MW1	5/29/2019	Mid-Screen	x				
MW-10	5/29/2019	Mid-Screen	x				
MW-11	5/30/2019	Mid-Screen	x				
OBTMW-01	5/30/2019	Mid-Screen	x				
PH-1	5/30/2019	NA	x				
PH-2-DUP	5/30/2019	NA	x				Field Duplicate
<b>SSI Groundwater Samples</b>							
AOI1-MW1-GW	10/11/2020	53.0	x				

**Table 5-1  
Samples by Medium  
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Sample Identification	Sample Collection Date	Sample Depth (ft bgs)	PFAS (USEPA Method 537 Modified)	TOC (USEPA Method 9060A)	pH (USEPA Method 9045D)	Grain Size (ASTM D422)	Comments
AOI1-MW2-GW	10/12/2020	38.5	x				
AOI1-MW3-GW	10/10/2020	45.0	x				
AOI1-MW3-GW-DUP	10/10/2020	45.0	x				Field Duplicate
AOI1-MW3-GW-MS	10/10/2020	45.0	x				MS
AOI1-MW3-GW-MSD	10/10/2020	45.0	x				MSD
AOI1-MW04-GW	10/14/2020	36.0	x				
AOI1-MW05-GW	10/12/2020	40.0	x				
AOI1-MW06-GW	10/13/2020	33.5	x				
BH-02-101020	10/10/2020	31.0	x				
FH-02-101120	10/11/2020	51.0	x				
AOI2-MW1-GW	10/12/2020	35.0	x				
AOI2-MW1-GW-DUP	10/12/2020	35.0	x				Field Duplicate
AOI2-MW2-GW	10/13/2020	25.0	x				
AOI2-MW03-GW	10/14/2020	36.0	x				
MW-08-101120	10/11/2020	50.0	x				
AOI3-MW1-GW	10/9/2020	56.5	x				
AOI3-MW02-GW	10/13/2020	56.0	x				
MW-11-100920	10/9/2020	52.0	x				
<b>Field Blank Samples</b>							
AOI1-HA1-2-4-EB	2/13/2019		x				Equipment Blank
AOI1-SS1-0-2-EB	2/14/2019		x				Equipment Blank
AOI1-MW3-EB	2/16/2019		x				Equipment Blank
AOI2-FRB	5/20/2016		x				Field Blank
AOI3-SB1-0-2-EB	5/21/2019		x				Equipment Blank
AOI2-SB1-0-2-EB	5/23/2019		x				Equipment Blank
FTWHH-ERB-01	10/6/2020		x				Equipment Blank
FTWHH-ERB-02	10/7/2020		x				Equipment Blank
FTWHH-ERB-03	10/10/2020		x				Equipment Blank
FTWHH-ERB-04	10/14/2020		x				Equipment Blank
FTWHH-FRB-01	10/10/2020		x				Field Blank

**Notes:**

AOI = Area of Interest  
ASTM = American Standard Test Method  
EB = equipment blank  
ERB = equipment blank  
FRB = field reagent blank  
GW = groundwater  
ft = feet  
HA = hand auger  
MS/MSD = matrix spike/ matrix spike duplicate  
MW = monitoring well  
NA = not applicable  
PFAS = per- and polyfluoroalkyl substances  
PH = Pump House  
R = recollected  
SB = soil boring  
SS = surface soil  
TOC = Total Organic Carbon  
USEPA = United States Environmental Protection Agency

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**Table 5-2**  
**Monitoring Well Screen Intervals**  
**Fort William Henry Harrison, MT**  
**Site Inspection Report**

Monitoring Well ID	Screen Interval (ft bgs)
AOI1-MW1	45-55
AOI1-MW2	30-40
AOI1-MW3	40-50
AOI1-MW4	28-38
AOI1-MW5	35-45
AOI1-MW6	27-37
AOI2-MW1	28-38
AOI2-MW2	20-30
AOI2-MW3	30-40
AOI3-MW1	48-58
AOI3-MW2	50-60
BH-02	29-34
FH-02	34.8-54.8
MW-05	29-39.2
MW-06	20-30
MW-07	29.1-39.1
MW-08	39.2-59.2
MW-10	59-79
MW-11	25-55
MW-12	35-55
OBTMW-01	20-50

**Notes:**

bgs = below ground surface

ft = feet

ID = identification

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**Table 5-3**  
**Groundwater Elevation**  
**Fort William Henry Harrison, MT**  
**Site Inspection Report**

Monitoring Well ID	Date Measured	Top of Casing Elevation (ft amsl)	Depth to Water (ft btoc)	Groundwater Elevation (ft amsl)
AOI1-MW1	5/30/2019	3985.92	31.25	3954.67
AOI1-MW2	5/30/2019	3976.32	31.85	3944.47
AOI1-MW3	5/30/2019	3948.75	32.44	3916.31
BH-02	5/30/2019	3968.06	24.04	3944.02
FH-02	5/30/2019	3954.95	34.17	3920.78
AOI2-MW1	5/30/2019	3950.83	21.10	3929.73
AOI2-MW2	5/30/2019	3946.64	14.23	3932.41
MW-06	5/30/2019	3952.55	20.65	3931.90
MW-07	5/30/2019	3948.40	16.44	3931.96
MW-08	5/30/2019	3959.17	27.19	3931.98
AOI3-MW1	5/30/2019	4003.43	42.87	3960.56
MW-10	5/30/2019	3977.10	29.87	3947.23
MW-11	5/30/2019	3981.19	27.81	3953.38
OBTMW-01	5/30/2019	3982.56	27.90	3954.66
AOI1-MW1	10/12/2020	3985.93	34.71	3951.22
AOI1-MW2	10/12/2020	3976.33	33.80	3942.53
AOI1-MW3	10/12/2020	3948.76	32.13	3916.63
AOI1-MW4	10/12/2020	3975.46	29.40	3946.06
AOI1-MW5	10/12/2020	3947.70	33.92	3913.78
AOI1-MW6	10/12/2020	3948.09	29.82	3918.27
BH-02	10/12/2020	3968.07	27.59	3940.48
FH-02	10/12/2020	3954.95	34.43	3920.52
AOI2-MW1	10/12/2020	3950.84	22.79	3928.05
AOI2-MW2	10/12/2020	3946.65	17.33	3929.32
AOI2-MW3	10/12/2020	3953.36	24.18	3929.18
MW-05	10/12/2020	3954.99	25.54	3929.45
MW-06	10/12/2020	3952.56	23.54	3929.02
MW-07	10/12/2020	3948.41	19.39	3929.02
MW-08	10/12/2020	3959.18	28.90	3930.28
AOI3-MW1	10/12/2020	4003.44	43.93	3959.51
AOI3-MW2	10/12/2020	3993.34	49.65	3943.69
MW-10	10/12/2020	3977.13	30.11	3947.02
MW-11	10/12/2020	3981.20	29.29	3951.91
MW-12	10/12/2020	3980.48	36.56	3943.92
OBTMW-01	10/12/2020	3982.57	29.65	3952.92

**Notes:**

amsl = above mean sea level

btoc = below top of casing

ft = feet

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## 6. Site Inspection Results

This section presents the analytical results of the SI for each AOI. The SLs used in this evaluation are presented in **Section 6.1**. A discussion of the results for each AOI is provided in **Sections 6.3** through **6.5**. **Table 6-2** through **Table 6-5** present PFAS results for samples with detections in soil and groundwater; only constituents detected in one or more samples are included. Tables that contain all results are provided in **Appendix F** and the laboratory reports are provided in **Appendix G**.

### 6.1 Screening Levels

The DoD has adopted a policy to retain facilities in the CERCLA process based on risk-based SLs for soil and groundwater, as described in a memorandum from the OSD dated 15 October 2019 (Assistant Secretary of Defense, 2019). The ARNG program under which this SI was performed follows this DoD policy. Should the maximum site concentration for sampled media exceed the SLs established in the OSD memorandum, the AOI will proceed to an RI, the next phase under CERCLA. The SLs apply to three compounds, PFOA, PFOS, and PFBS, for both soil and groundwater, as presented in **Table 6-1**.

All other results presented in this report are considered informational in nature and serve as an indication as to whether soil and groundwater contain or do not contain PFAS within the boundaries of the facility.

**Table 6-1: Screening Levels (Soil and Groundwater)**

Analyte	Residential (Soil) (µg/kg) <sup>a</sup> 0-2 feet bgs	Industrial/ Commercial Composite Worker (Soil) (µg/kg) <sup>a</sup> 2-15 feet bgs	Tap Water (Groundwater) (ng/L) <sup>a</sup>
<b>PFOA</b>	130	1,600	40
<b>PFOS</b>	130	1,600	40
<b>PFBS</b>	130,000	1,600,000	40,000

**Notes:**

a.) Assistant Secretary of Defense, 2019. Risk Based Screening Levels Calculated for PFOS, PFOA, PFBS in Groundwater and Soil using United States Environmental Protection Agency's (USEPA's) Regional Screening Level Calculator. HQ=0.1. 15 October 2019.

### 6.2 Soil Physicochemical Analyses

To provide basic soil parameter information, soil samples were analyzed for TOC and pH, which are important for evaluating transport through the soil medium. **Appendix F** contains the results of the TOC and pH sampling.

The data collected in this investigation will be used in subsequent investigations, where appropriate, to assess fate and transport of PFAS contaminants. According to the Interstate Technology Regulatory Council (ITRC), several important PFAS partitioning mechanisms include hydrophobic and lipophobic effects, electrostatic interactions, and interfacial behaviors. At relevant environmental pH values, certain PFAS are present as organic anions and are therefore relatively mobile in groundwater (Xiao et al., 2015) but tend to associate with the organic carbon fraction that may be present in soil or sediment (Higgins and Luthy 2006; Guelfo and Higgins, 2013). When sufficient organic carbon is present, organic carbon normalized distribution coefficients (Koc values) can help in evaluating transport potential, though other geochemical

factors (for example, pH and presence of polyvalent cations) may also affect PFAS sorption to solid phases (ITRC, 2018).

## 6.3 AOI 1

This section presents the analytical results for soil and groundwater in comparison to SLs for AOI 1, which includes seven potential PFAS release areas: Black-Tailed Prairie Dog Relocation areas (three locations), MTARNG 1049th Engineer Detachment Building 1010, Mt. Defensa Avenue Drainage Ditch, 1049th Firefighting Training Area 1, and 1049th Firefighting Training Area 3. The detected compounds in soil and groundwater are summarized in **Tables 6-2** through **6-5**. The detections of PFOA and PFOS in soil and groundwater are presented on **Figures 6-1** through **6-6**.

### 6.3.1 AOI 1 Soil Analytical Results

Within the Mt. Defensa Avenue Drainage Ditch, soil was sampled at three intervals from soil borings locations AOI1-SB1 and AOI1-SB3 and one interval from surface locations AOI1-SS1 through AOI1-SS6. All PFOA, PFOS, and PFBS results were below SLs. PFOA concentrations ranged from non-detect to 0.122 J micrograms per Kilogram ( $\mu\text{g/Kg}$ ), which occurred at AOI1-SB3 in the shallow interval (0 to 2 feet bgs). PFOS concentrations ranged from non-detect to 2.23  $\mu\text{g/Kg}$ , which occurred at AOI1-SS5 in the shallow interval (0 to 2 feet bgs). PFBS concentrations ranged from non-detect to 0.012 J  $\mu\text{g/Kg}$ , which occurred in AOI1-SB3 in the shallow interval (0 to 2 feet bgs). In the intermediate interval, PFOA concentrations were non-detect. PFOS concentrations ranged from 0.039 J  $\mu\text{g/Kg}$  in AOI1-SB1 (20 to 22 feet bgs) to 0.526 J  $\mu\text{g/Kg}$  in AOI1-SB3 (18 to 20 feet bgs). PFBS concentrations ranged from 0.00418 J  $\mu\text{g/Kg}$  in AOI1-SB1 (20 to 22 feet bgs) to 0.021 J  $\mu\text{g/Kg}$  in AOI1-SB3 (18 to 20 feet bgs). In the deep interval, PFOA and PFBS concentrations were non-detect. PFOS concentrations ranged from 0.014 J  $\mu\text{g/Kg}$  in AOI1-SB1 (38 to 40 feet bgs) to 0.135 J  $\mu\text{g/Kg}$ , in AOI1-SB3 (38 to 40 feet bgs). **Table 6-2** and **Table 6-4** summarize the detected compounds in soil. **Figure 6-1** and **Figure 6-2** present ranges of detections of PFOS and PFOA in soil.

Within the 1049th Engineer Detachment Building 1010 area, soil was sampled at three intervals from soil boring location AOI1-SB2. All PFOA, PFOS, and PFBS results were below SLs. PFOA was non-detect in the shallow interval (0 to 2 feet bgs). PFOS was detected at 0.751 J  $\mu\text{g/Kg}$  and PFBS was detected at 0.104 J  $\mu\text{g/Kg}$ . In the intermediate interval (15 to 17 feet bgs), PFOA was detected at 0.055 J  $\mu\text{g/Kg}$ , PFOS was detected at 0.478 J  $\mu\text{g/Kg}$ , and PFBS was detected at 0.142 J  $\mu\text{g/Kg}$ . PFOA, PFOS, and PFBS were non-detect in the deep interval (28 to 30 feet bgs). **Table 6-2** and **Table 6-4** summarize the detected compounds in soil. **Figure 6-1** and **Figure 6-2** present ranges of detections of PFOS and PFOA in soil.

Within in the Prairie Dog Relocation areas, soil was sampled at two intervals from hand auger locations AOI1-HA1 and AOI1-HA2. All PFOA, PFOS, and PFBS results were below SLs. PFOA and PFOS concentrations were all non-detect in the shallow interval (0 to 2 feet bgs) and intermediate interval (2 to 4 feet bgs). PFBS concentrations ranged from non-detect in AOI1-HA2 (2 to 4 feet bgs) to 0.00547 J  $\mu\text{g/Kg}$  in AOI1-HA2 (2 to 4 feet bgs). **Table 6-2** and **Table 6-3** summarize the detected compounds in soil. **Figure 6-1** and **Figure 6-2** present ranges of detections of PFOS and PFOA in soil.

Soil was sampled at three intervals from soil borings locations AOI01-04-SB through AOI01-06-SB and one interval from surface locations AOI1-SS8 through AOI1-SS10 at the FTWHH parcel of property located on the east side of Williams Street. PFOA, PFOS, and PFBS concentrations were non-detect.

Within in the 1049th Firefighting Training Area 1, surface soil was sampled from location AOI01-SS7. PFOA, PFOS, and PFBS results were below SLs. PFOA and PFBS concentrations were

non-detect. The PFOS concentration was 0.630 J  $\mu\text{g/Kg}$ , which occurred in the shallow interval (0 to 2 feet bgs). **Table 6-2** summarize the detected compounds in soil. **Figure 6-3** present the detections of PFOS in soil.

Within in the 1049th Firefighting Training Area 3, surface soil was sampled from locations AOI01-SS11 through AOI01-SS15 (0 to 2 feet bgs). All PFOA, PFOS, and PFBS results were below SLs. PFOA concentrations ranged from non-detect to 0.166 J  $\mu\text{g/Kg}$ , which occurred in AOI1-SS11 (0 to 2 feet bgs). PFOS concentrations ranged from non-detect to 39.9  $\mu\text{g/Kg}$ , which occurred in AOI1-SS11 (0 to 2 feet bgs). PFBS concentrations ranged from non-detect to 1.08  $\mu\text{g/Kg}$ , which occurred in AOI1-SS11 (0 to 2 feet bgs). **Table 6-2** summarizes the detected compounds in soil. **Figure 6-3** and **Figure 6-4** present ranges of detections of PFOS and PFOA in soil.

### 6.3.2 AOI 1 Groundwater Analytical Results

PFOA, PFOS, and PFBS were detected in 13 of the 13 groundwater samples collected in AOI 1. All PFOA and PFBS results were below SLs. PFOA was detected in 12 of 13 samples and ranged in concentrations from non-detect to 13.5 ng/L (14.3 ng/L duplicate), which was detected in AOI1-MW3. PFOS was detected below the SLs at all well locations with the exception of AOI1-MW3. PFOS concentrations ranged from 2.61 J ng/L at BH-02 to 62.2 ng/L (61.6 ng/L duplicate) at AOI1-MW3. PFBS was detected in 12 of 13 samples and ranged in concentrations from non-detect (BH-02) to 34.1 ng/L (AOI1-MW3). The detected compounds are summarized in **Table 6-5**. **Figure 6-5** and **Figure 6-6** present the range of detections for PFOS and PFOA at the facility.

### 6.3.3 AOI 1 Conclusions

Based on the results of SI, PFOA, PFOS, and PFBS were detected in soil at AOI 1; however, the detected concentrations were below soil SLs. PFOA and PFBS were detected in groundwater at AOI 1, and PFOS exceeded SLs. Therefore, further evaluation at AOI 1 is warranted as part of an RI.

## 6.4 AOI 2

This section presents the analytical results for soil and groundwater in comparison to SLs for AOI 2, which includes four potential PFAS release areas: Former Weasel Barn, Excavated Soil from Mt. Defensa Ave Drainage Ditch, 1049th Engineer Detachment Building M1, and 1049th Firefighting Training Area 4. The detected compounds in soil and groundwater are summarized in **Tables 6-2** through **6-5**. The detections of PFOS and PFOA in soil and groundwater are presented on **Figures 6-1** through **6-6**.

### 6.4.1 AOI 2 Soil Analytical Results

Within the Former Weasel Barn area, soil was sampled at three intervals from soil boring location AOI2-SB1; two intervals from hand auger location AOI2-HA6; and one interval from surface locations AOI2-SS1 through AOI2-SS5. All PFOA, PFOS, and PFBS results were below SLs. PFOA concentrations ranged from non-detect to 0.271 J  $\mu\text{g/Kg}$ , which occurred at AOI2-SB1 in the shallow interval (0 to 2 feet bgs). PFOS concentrations ranged from 0.181 J  $\mu\text{g/Kg}$  in AOI2-SS3 (0 to 2 feet bgs) to 10.9  $\mu\text{g/Kg}$  in AOI2-HA6 (0 to 2 feet bgs). PFBS concentrations ranged from non-detect to 0.07 J  $\mu\text{g/Kg}$  in AOI2-HA6 (0 to 2 feet bgs). In the intermediate interval, PFOA concentrations ranged from non-detect to 0.087 J  $\mu\text{g/Kg}$ , which occurred at AOI2-HA6 (2 to 4 feet bgs). PFOS concentrations ranged from 0.046 J  $\mu\text{g/Kg}$  in AOI2-SB1 (9 to 11 feet bgs) to 0.572 J  $\mu\text{g/Kg}$  in AOI2-HA6 (2 to 4 feet bgs). PFBS concentrations ranged from non-detect to 0.036 J  $\mu\text{g/Kg}$ , which was detected in AOI2-HA6 (2 to 4 feet bgs). In the deep interval, PFOS and PFBS were non-detect (AOI2-SB1). PFOS was detected at a concentration of 0.00678 J  $\mu\text{g/Kg}$  (18 to 20 feet bgs). **Tables 6-2** through **6-4** summarize the detected compounds in soil. **Figure 6-1** and **Figure 6-2** present ranges of detections of PFOS and PFOA in soil.

Within the Excavated Soil from Mt. Defensa Ave Drainage Ditch area, soil was sampled at two intervals from hand auger locations AOI2-HA1 through AOI2-HA5. All PFOA, PFOS, and PFBS results were below SLs. In the shallow interval (0 to 2 feet bgs), PFOA concentrations ranged from non-detect to 0.126 J µg/Kg, which occurred at AOI2-HA5. PFOS concentrations ranged from 0.086 J µg/Kg in AOI2-HA2 (0 to 2 feet bgs) to 1.73 µg/Kg in AOI2-HA5 (0 to 2 feet bgs). PFBS concentrations ranged from non-detect to 0.059 J µg/Kg, which was detected in AOI2-HA3 (0 to 2 feet bgs). In the intermediate interval (2 to 4 feet bgs), concentrations of PFOA ranged from non-detect to 0.083 J µg/Kg, which was detected in AOI2-HA4. PFOS concentrations ranged from non-detect to 1.92 µg/Kg, which occurred at AOI2-HA5 (2 to 4 feet bgs). PFBS concentrations ranged from non-detect to 0.047 J µg/Kg, which occurred in AOI2-HA5 (2 to 4 feet bgs). **Table 6-2** and **Table 6-3** summarize the detected compounds in soil. **Figure 6-1** and **Figure 6-2** present ranges of detections of PFOS and PFOA in soil.

Within the 1049th Engineer Detachment Building M1 area, soil was sampled at three intervals from soil boring location AOI2-SB2. All PFOA, PFOS, and PFBS results were below SLs. In the shallow interval (0 to 2 feet bgs), PFOA was detected at a concentration of 0.042 J µg/Kg. PFOS was detected at a concentration of 4.31 J µg/Kg (0 to 2 feet bgs). PFBS was non-detect. In the intermediate interval (2 to 11 feet bgs), PFOS and PFBS were non-detect. PFOS was detected at a concentration of 0.046 J µg/Kg. In the deep interval (18 to 20 feet bgs), PFOA, PFOS, and PFBS were non-detect. **Tables 6-2** through **6-4** summarize the detected compounds in soil. **Figure 6-1** and **Figure 6-2** present ranges of detections of PFOS and PFOA in soil.

Within the 1049th Firefighting Training Area 4, soil was sampled at three intervals from soil boring location AOI02-03-SB and one interval from surface locations AOI02-SS6 through AOI02-SS8. All PFOA, PFOS, and PFBS results were below SLs. In the shallow interval (0 to 2 feet bgs), PFOA and PFBS concentrations were non-detect. PFOS concentrations ranged from non-detect to 0.807 J µg/Kg, which occurred at AOI02-03-SB-DUP (0 to 2 feet bgs). In the intermediate and deep intervals, PFOA, PFOS, and PFBS were non-detect with the exception of a PFOS detection of 0.00678 J µg/Kg in the deep interval of AOI2-03-SB (25 to 27 feet bgs). **Tables 6-2** through **6-4** summarize the detected compounds in soil. **Figure 6-3** and **Figure 6-4** present ranges of detections of PFOS and PFOA in soil.

#### 6.4.2 AOI 2 Groundwater Analytical Results

PFOA, PFOS, and PFBS were detected in seven of nine groundwater samples collected in AOI 2. PFOS exceeded SLs at AOI2-MW1 (118 ng/L). PFOA concentrations ranged from non-detect to 14.6 ng/L (AOI2-MW1-DUP). PFOS concentrations ranged from non-detect to 118 ng/L (AOI2-MW1). PFBS concentrations ranged from non-detect to 27.3 ng/L (AOI2-MW1). The detected compounds are summarized in **Table 6-5**. **Figure 6-5** and **Figure 6-6** present the range of detections for PFOS and PFOA at the facility.

#### 6.4.3 AOI 2 Conclusions

Based on the results of SI, PFOA, PFOS, and PFBS were detected in soil at AOI 2; however, the detected concentrations were below soil SLs. PFOA and PFBS were detected in groundwater at AOI 2 and PFOS exceeded SLs. Therefore, further evaluation at AOI 2 is warranted as part of an RI.

### 6.5 AOI 3

This section presents the analytical results for soil and groundwater in comparison to SLs for AOI 3, which includes two potential PFAS release area: Planned Structure Fire and 1049th Firefighting Training Area 2. The detected compounds in soil and groundwater are summarized in **Tables 6-2** through **6-5**. The detections of PFOA and PFOS in soil and groundwater are presented on **Figures 6-1** through **6-6**.



### 6.5.1 AOI 3 Soil Analytical Results

Within the Planned Structure Fire area, soil was sampled at three intervals from soil boring location AOI3-SB1 and two intervals from hand auger location AOI3-HA1. All PFOA, PFOS, and PFBS results were below SLs. In the shallow interval (0 to 2 feet bgs), PFOA concentrations ranged from non-detect to 0.473 J  $\mu\text{g/Kg}$ , which occurred at AOI3-SB1. PFOS concentrations ranged from non-detect to 12.3  $\mu\text{g/Kg}$ , which was detected in AOI3-SB1 (0 to 2 feet bgs). PFBS concentrations ranged from non-detect to 0.178 J  $\mu\text{g/Kg}$ , which was detected in AOI3-SB1 (0 to 2 feet bgs). In the intermediate interval (2 to 20 feet bgs), PFOA and PFBS were non-detect. PFOS was detected at a concentration of 0.056 J  $\mu\text{g/Kg}$  in AOI3-SB1 (18 to 20 feet bgs). In the deep interval (40 to 42 feet bgs), PFOA was non-detect. PFOS was detected at a concentration of 0.021 J  $\mu\text{g/Kg}$  in AOI3-SB1 (40 to 42 feet bgs). PFBS was detected at a concentration of 0.147 J  $\mu\text{g/Kg}$  in AOI3-SB1 (40 to 42 feet bgs.). **Tables 6-2** through **6-4** summarize the detected compounds in soil. **Figure 6-1** and **Figure 6-2** present ranges of detections of PFOS and PFOA in soil.

Within the 1049th Firefighting Training Area 2, soil was sampled at one interval from soil boring location AOI03-02-SB and from surface soil locations AOI03-SS1 through AOI03-SS5. All PFOA, PFOS, and PFBS results were below SLs. In the shallow interval (0 to 2 feet bgs), PFOA and PFBS concentrations were non-detect. PFOS concentrations ranged from non-detect to 2.91  $\mu\text{g/Kg}$ , which occurred at AOI03-SS3 (0 to 2 feet bgs). **Table 6-2** summarizes the detected compounds in soil. **Figure 6-3** and **Figure 6-4** present ranges of detections of PFOS and PFOA in soil.

### 6.5.2 AOI 3 Groundwater Analytical Results

PFOA, PFOS, and PFBS were detected in six of nine groundwater samples collected in AOI 3. All PFOA, PFOS, and PFBS results were below SLs. PFOA concentrations ranged from non-detect to 1.71 J  $\text{ng/L}$  (MW-10). PFOS concentrations ranged from non-detect to 2.32 J  $\text{ng/L}$  (AOI03-MW02). PFBS concentrations ranged from non-detect to 59.2  $\text{ng/L}$  (AOI3-MW1). The detected compounds are summarized in **Table 6-5**. **Figure 6-5** and **Figure 6-6** present the range of detections for PFOS and PFOA at the facility.

### 6.5.3 AOI 3 Conclusions

Based on the results of SI, PFOA, PFOS, and PFBS were detected in soil at AOI 3; however, the detected concentrations were below soil SLs. PFOA, PFOS, and PFBS were detected in groundwater at AOI 3, but were below groundwater SLs. Therefore, further evaluation at AOI 3 is not warranted.

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**Table 6-2**  
**PFAS Detections in Surface Soil**  
**Site Inspection Report, Fort William Henry Harrison**

Area of Interest Sample ID Sample Date Depth		AOI01																			
		AOI1-HA1-0-2		AOI1-HA2-0-2		AOI1-SB1-0-2		AOI1-SB2-0-2		AOI1-SB3-0-2		AOI01-04-SB-00-02		AOI01-05-SB-00-02		AOI01-06-SB-00-02		AOI1-SS1-0-2		AOI1-SS1-0-2R	
		02/12/2019		02/12/2019		02/13/2019		02/15/2019		02/20/2019		10/07/2020		10/06/2020		10/06/2020		02/14/2019		05/20/2019	
		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft	
Analyte	OSD Screening Level <sup>a</sup>	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
<b>Soil, PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (µg/Kg)</b>																					
6:2 FTS	-	0.043	J	0.043	X	ND		ND		ND		ND		ND		ND		ND		ND	
8:2 FTS	-	ND		ND	UX	ND		ND		0.015	J	ND		ND		ND		ND		ND	
NEtFOSAA	-	ND		ND	UX	ND		ND		0.011	J	ND		ND		ND		ND		ND	
NMeFOSAA	-	ND		ND	UX	ND		ND		ND		ND		ND		ND		ND		ND	
PFBA	-	ND		ND	UX	ND		0.305	J	ND		ND		ND		1.42		ND		0.051	J
PFBS	130000	ND		ND	UX	ND		0.104	J	0.012	J	ND		ND		ND		ND		ND	
PFDA	-	ND		ND	UX	ND		ND		ND		ND		ND		ND		ND		0.021	J
PFDaA	-	ND		ND	UX	ND		ND		ND		ND		ND		ND		ND		0.00951	J
PFHpA	-	0.015	J	ND	UX	ND		0.163	J	0.043	J	ND		ND		ND		ND		0.018	J
PFHxA	-	0.197	J	0.068	X	0.03	J	0.618	J	ND		ND		ND		ND		ND		ND	
PFHxS	-	ND		ND	UX	ND		7.97		0.103	J	ND		ND		ND		ND		0.011	J
PFNA	-	ND		ND	UX	ND		ND		0.032	J	ND		ND		ND		ND		0.066	J
PFOA	130	ND		ND	UX	ND		ND		0.122	J	ND		ND		ND		ND		0.069	J
PFOS	130	ND		ND	UX	ND		0.751	J	0.664	J	ND		ND		ND		0.082	J	0.386	J
PFPeA	-	0.102	J	ND	UX	ND		0.364	J	0.087	J	ND		ND		ND		ND		ND	
PFTeDA	-	ND		ND	UX	ND		ND		0.015	J	ND		ND		ND		ND		ND	
PFTrDA	-	ND		ND	UX	ND		ND		0.00995	J	ND		ND		ND		ND		ND	
PFUnDA	-	ND		ND	UX	ND		ND		0.013	J	ND		ND		ND		ND		0.011	J

**Grey Fill** Detected concentration exceeded OSD Screening Level

References

a. Assistant Secretary of Defense, 2019. Risk Based Screening Levels Calculated for PFOS, PFOA, PFBS in Groundwater or Soil using USEPA's Regional Screening Level Calculator. HQ=0.1. 15 October 2019. Soil screening levels based on residential scenario for direct ingestion of contaminated soil.

Interpreted Qualifiers

J = Estimated concentration

J+ = Estimated concentration, biased high

UJ = The analyte was not detected at a level greater than or equal to the adjusted DL. However, the reported adjusted DL is approximate and may be inaccurate or imprecise.

UX/X = The presence or absence of the analyte cannot be substantiated. Acceptance or rejection of the data should be decided by the project team, but exclusion of the data is recommended.

Chemical Abbreviations

6:2 FTS	6:2 fluorotelomer sulfonate
8:2 FTS	8:2 fluorotelomer sulfonate
NEtFOSAA	N-ethyl perfluorooctane- sulfonamidoacetic acid
NMeFOSAA	N-methyl perfluorooctanesulfonamidoacetic acid
PFAS	per- and polyfluoroalkyl substances
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFDaA	perfluorododecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid
PFTeDA	perfluorotetradecanoic acid
PFTrDA	perfluorotridecanoic acid
PFUnDA	perfluoro-n-undecanoic acid

Acronyms and Abbreviations

AOI	Area of Interest
DL	detection limit
DUP	Duplicate
ft	feet
HA	Hand auger
HQ	Hazard quotient
ID	identification
LCMSMS	Liquid Chromatography Mass Spectrometry
LOD	Limit of Detection
ND	Analyte not detected above the LOD
OSD	Office of the Secretary of Defense
QSM	Quality Systems Manual
Qual	Interpreted Qualifier
SB	Soil boring
SS	Surface Soil
USEPA	United States Environmental Protection Agency
µg/Kg	micrograms per Kilogram
-	Not applicable

**Table 6-2**  
**PFAS Detections in Surface Soil**  
**Site Inspection Report, Fort William Henry Harrison**

Area of Interest Sample ID Sample Date Depth		AOI01																			
		AOI1-SS2-0-2		AOI1-SS3-0-2		AOI1-SS4-0-2		AOI1-SS5-0-2		AOI1-SS6-0-2		AOI01-SS7-00-02		AOI01-SS8-00-02		AOI01-SS9-00-02		AOI01-SS10-00-02		AOI01-SS11-00-02	
		02/14/2019		02/14/2019		02/14/2019		02/14/2019		02/20/2019		10/07/2020		10/06/2020		10/06/2020		10/06/2020		10/07/2020	
		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft	
Analyte	OSD Screening Level <sup>a</sup>	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Soil, PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (µg/Kg)																					
6:2 FTS	-	ND		ND		ND	UJ	ND		ND		ND		ND		ND		ND		ND	
8:2 FTS	-	ND		ND		ND	UJ	ND		ND		ND		ND		ND		ND		ND	
NEtFOSAA	-	ND		ND		ND	UJ	0.014	J	ND		ND		ND		ND		ND		ND	
NMeFOSAA	-	ND		ND		ND	UJ	ND		ND		ND		ND		ND		ND		ND	
PFBA	-	ND		ND		0.029	J	ND		ND		ND		ND		ND		ND		0.205	J
PFBS	130000	ND		ND		ND	UJ	ND		0.010	J	ND		ND		ND		ND		1.08	
PFDA	-	ND		0.034	J	ND	UJ	ND		ND		ND		ND		ND		ND		ND	
PFDoA	-	ND		ND		ND	UJ	ND		0.016	J	ND		ND		ND		ND		ND	
PFHpA	-	ND		0.018	J	ND	UJ	0.023	J	0.026	J	ND		ND		ND		ND		ND	
PFHxA	-	ND		0.092	J	0.064	J	ND		ND		ND		ND		ND		ND		0.769	J
PFHxS	-	ND		0.252	J	ND	UJ	0.058	J	0.068	J	ND		ND		ND		ND		4.38	
PFNA	-	ND		0.01	J	ND	UJ	0.065	J	ND		ND		ND		ND		ND		ND	
PFOA	130	ND		0.064	J	ND	UJ	0.106	J	0.089	J	ND		ND		ND		ND		0.166	J
PFOS	130	ND		0.249	J	ND	UJ	2.23		0.822	J	0.630	J	ND		ND		ND		39.9	
PFPeA	-	ND		0.0099	J	ND	UJ	0.039	J	0.043	J	ND		ND		ND		ND		0.180	J
PFTeDA	-	ND		ND		ND	UJ	ND		0.015	J	ND		ND		ND		ND		ND	
PFTrDA	-	ND		ND		ND	UJ	ND		ND		ND		ND		ND		ND		ND	
PFUnDA	-	ND		ND		ND	UJ	ND		0.018	J	ND		ND		ND		ND		ND	

**Grey Fill** Detected concentration exceeded OSD Screening Level

References

a. Assistant Secretary of Defense, 2019. Risk Based Screening Levels Calculated for PFOS, PFOA, PFBS in Groundwater or Soil using USEPA's Regional Screening Level Calculator. HQ=0.1. 15 October 2019. Soil screening levels based on residential scenario for direct ingestion of contaminated soil.

Interpreted Qualifiers

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J+ = Estimated concentration, biased high

UJ = The analyte was not detected at a level greater than or equal to the adjusted detection limit (DL). However, the reported adjusted DL is approximate and may be inaccurate or imprecise.

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Chemical Abbreviations

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8:2 FTS	8:2 fluorotelomer sulfonate
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NMeFOSAA	N-methyl perfluorooctanesulfonamidoacetic acid
PFAS	per- and polyfluoroalkyl substances
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFDoA	perfluorododecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid
PFTeDA	perfluorotetradecanoic acid
PFTrDA	perfluorotridecanoic acid
PFUnDA	perfluoro-n-undecanoic acid

Acronyms and Abbreviations

AOI	Area of Interest
DL	detection limit
DUP	Duplicate
ft	feet
HA	Hand auger
HQ	Hazard quotient
ID	identification
LCMSMS	Liquid Chromatography Mass Spectrometry
LOD	Limit of Detection
ND	Analyte not detected above the LOD
OSD	Office of the Secretary of Defense
QSM	Quality Systems Manual
Qual	Interpreted Qualifier
SB	Soil boring
SS	Surface Soil
USEPA	United States Environmental Protection Agency
µg/Kg	micrograms per Kilogram
-	Not applicable

**Table 6-2**  
**PFAS Detections in Surface Soil**  
**Site Inspection Report, Fort William Henry Harrison**

Area of Interest		AOI01								AOI02											
		AOI01-SS12-00-02		AOI01-SS13-00-02		AOI01-SS14-00-02		AOI01-SS15-00-02		AOI2-HA1-0-2		AOI2-HA2-0-2		AOI2-HA3-0-2		AOI2-HA4-0-2		AOI2-HA5-0-2		AOI2-HA6-0-2	
		10/07/2020		10/07/2020		10/07/2020		10/07/2020		02/13/2019		02/13/2019		02/13/2019		02/13/2019		02/13/2019		02/12/2019	
		Depth		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft	
Analyte	OSD Screening Level <sup>a</sup>	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Soil, PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (µg/Kg)																					
6:2 FTS	-	ND		ND		ND		ND		0.059	J	0.044	J	ND		ND		ND		ND	
8:2 FTS	-	ND		ND		ND		ND		ND		ND		ND		ND		ND		ND	
NEtFOSAA	-	ND		ND		ND		ND		ND		ND		ND		ND		ND		ND	
NMeFOSAA	-	ND		ND		ND		ND		ND		ND		ND		ND		ND		ND	
PFBA	-	ND		ND		ND		ND		ND		ND		ND		ND		ND		ND	
PFBS	130000	ND		ND		ND		ND		ND		0.059	J	ND		0.057	J	0.07	J		
PFDA	-	ND		ND		ND		ND		0.026	J	ND		ND		0.035	J	ND			
PFDoA	-	ND		ND		ND		ND		ND		ND		ND		0.013	J	ND			
PFHpA	-	ND		ND		ND		ND		0.018	J	ND		0.029	J	0.02	J	0.066	J	0.124	J
PFHxA	-	ND		ND		ND		ND		0.066	J	0.029	J	0.151	J	0.053	J	0.179	J	0.351	J
PFHxS	-	ND		ND		ND		ND		0.042	J	0.025	J	0.118	J	0.05	J	0.628	J	2.27	
PFNA	-	ND		ND		ND		ND		ND		ND		0.013	J	ND		0.074	J		
PFOA	130	ND		ND		ND		ND		ND		ND		0.042	J	0.126	J	0.265	J		
PFOS	130	ND		2.11		0.872	J	1.03		0.217	J	0.086	J	0.233	J	0.407	J	1.73		10.9	
PFPeA	-	ND		ND		ND		ND		ND		ND		ND		ND		0.016	J	ND	
PFTeDA	-	ND		ND		ND		ND		ND		ND		ND		ND		ND		ND	
PFTrDA	-	ND		ND		ND		ND		ND		ND		ND		ND		ND		ND	
PFUnDA	-	ND		ND		ND		ND		ND		ND		ND		ND		ND		ND	

**Grey Fill** Detected concentration exceeded OSD Screening Level

References

a. Assistant Secretary of Defense, 2019. Risk Based Screening Levels Calculated for PFOS, PFOA, PFBS in Groundwater or Soil using USEPA's Regional Screening Level Calculator. HQ=0.1. 15 October 2019. Soil screening levels based on residential scenario for direct ingestion of contaminated soil.

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8:2 FTS	8:2 fluorotelomer sulfonate
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NMeFOSAA	N-methyl perfluorooctanesulfonamidoacetic acid
PFAS	per- and polyfluoroalkyl substances
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorododecanoic acid
PFDoA	perfluorododecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid
PFTeDA	perfluorotetradecanoic acid
PFTIDA	perfluorotridecanoic acid
PFUnDA	perfluoro-n-undecanoic acid

Acronyms and Abbreviations

AOI	Area of Interest
DL	detection limit
DUP	Duplicate
ft	feet
HA	Hand auger
HQ	Hazard quotient
ID	identification
LCMSMS	Liquid Chromatography Mass Spectrometry
LOD	Limit of Detection
ND	Analyte not detected above the LOD
OSD	Office of the Secretary of Defense
QSM	Quality Systems Manual
Qual	Interpreted Qualifier
SB	Soil boring
SS	Surface Soil
USEPA	United States Environmental Protection Agency
µg/Kg	micrograms per Kilogram
-	Not applicable

**Table 6-2**  
**PFAS Detections in Surface Soil**  
**Site Inspection Report, Fort William Henry Harrison**

Area of Interest		AOI02																			
		AOI2-SB1-0-2		AOI2-SB2-0-2		AOI2-SB2-0-2-DUP		AOI02-03-SB-00-02		AOI02-03-SB-00-02-DUP		AOI2-SS1-0-2		AOI2-SS2-0-2		AOI2-SS2-0-2-DUP		AOI2-SS3-0-2		AOI2-SS4-0-2	
		Sample ID		Sample Date		Sample Date		Sample Date		Sample Date		Sample Date		Sample Date		Sample Date		Sample Date		Sample Date	
		Depth		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft	
Analyte	OSD Screening Level <sup>a</sup>	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Soil, PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (µg/Kg)																					
6:2 FTS	-	0.022	J	0.027	J	ND		ND		ND		ND		0.023	J	ND		ND		ND	
8:2 FTS	-	ND		0.014	J	ND		ND		ND		0.033	J	ND		ND		ND		ND	
NEtFOSAA	-	ND		0.013	J	ND		ND		ND		ND		ND		ND		ND		ND	
NMeFOSAA	-	ND		ND		ND		ND		ND		ND		0.029	J	ND		ND		ND	
PFBA	-	0.212	J	ND		0.051	J	ND		ND		0.215	J	ND		ND		0.071	J	ND	
PFBS	130000	0.039	J	ND		ND		ND		ND		0.03	J	ND		ND		0.00705	J	ND	
PFDA	-	0.041	J	0.08	J	ND		ND		ND		ND		ND		0.024	J	0.012	J	0.03	J
PFDoA	-	ND		0.026	J	ND		ND		ND		0.00614	J	ND		ND		ND		ND	
PFHpA	-	0.145	J	0.018	J	0.055	J	ND		ND		0.085	J	0.012	J	0.00955	J	0.013	J	ND	
PFHxA	-	0.392	J	ND		0.096	J	ND		ND		ND		ND		ND		ND		ND	
PFHxS	-	0.684	J	0.131	J	0.289	J	ND		ND		0.193	J	0.025	J	0.038	J	0.032	J	0.069	J
PFNA	-	0.084	J	0.035	J	0.141	J	ND		ND		0.074	J	0.03	J	0.025	J	ND		0.048	J
PFOA	130	0.271	J	0.042	J	0.135	J	ND		ND		0.132	J	ND		0.055	J	ND		0.098	J
PFOS	130	4.14	J	4.31	J	22	J	0.602	J	0.807	J	2.22	J	0.893	J	0.758	J	0.181	J	1.09	J+
PFPeA	-	0.228	J	ND		ND		ND		ND		0.421	J	ND		ND		0.14	J	ND	
PFTeDA	-	ND		0.014	J	ND		ND		ND		ND		ND		ND		ND		ND	
PFTrDA	-	ND		ND		ND		ND		ND		ND		ND		ND		ND		ND	
PFUnDA	-	0.015	J	0.022	J	ND		ND		ND		ND		0.00894	J	ND		ND		ND	

**Grey Fill** Detected concentration exceeded OSD Screening Level

References

a. Assistant Secretary of Defense, 2019. Risk Based Screening Levels Calculated for PFOS, PFOA, PFBS in Groundwater or Soil using USEPA's Regional Screening Level Calculator. HQ=0.1. 15 October 2019. Soil screening levels based on residential scenario for direct ingestion of contaminated soil.

Interpreted Qualifiers

J = Estimated concentration

J+ = Estimated concentration, biased high

UJ = The analyte was not detected at a level greater than or equal to the adjusted detection limit (DL). However, the reported adjusted DL is approximate and may be inaccurate or imprecise.

UXX = The presence or absence of the analyte cannot be substantiated. Acceptance or rejection of the data should be decided by the project team, but exclusion of the data is recommended.

Chemical Abbreviations

6:2 FTS	6:2 fluorotelomer sulfonate
8:2 FTS	8:2 fluorotelomer sulfonate
NEtFOSAA	N-ethyl perfluorooctane- sulfonamidoacetic acid
NMeFOSAA	N-methyl perfluorooctanesulfonamidoacetic acid
PFAS	per- and polyfluoroalkyl substances
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFDoA	perfluorododecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid
PFTeDA	perfluorotetradecanoic acid
PFTrDA	perfluorotridecanoic acid
PFUnDA	perfluoro-n-undecanoic acid

Acronyms and Abbreviations

AOI	Area of Interest
DL	detection limit
DUP	Duplicate
ft	feet
HA	Hand auger
HQ	Hazard quotient
ID	identification
LCMSMS	Liquid Chromatography Mass Spectrometry
LOD	Limit of Detection
ND	Analyte not detected above the LOD
OSD	Office of the Secretary of Defense
QSM	Quality Systems Manual
Qual	Interpreted Qualifier
SB	Soil boring
SS	Surface Soil
USEPA	United States Environmental Protection Agency
µg/Kg	micrograms per Kilogram
-	Not applicable



**Table 6-2**  
**PFAS Detections in Surface Soil**  
**Site Inspection Report, Fort William Henry Harrison**

Area of Interest Sample ID Sample Date Depth		AOI02								AOI03											
		AOI2-SS5-0-2		AOI02-SS6-00-02		AOI02-SS7-00-02		AOI02-SS8-00-02		AOI3-HA1-0-2		AOI03-02-SB-00-02		AOI3-SB1-0-2		AOI03-SS1-00-02		AOI03-SS2-00-02		AOI03-SS3-00-02	
		05/20/2019		10/06/2020		10/06/2020		10/06/2020		02/12/2019		10/06/2020		05/22/2019		10/07/2020		10/07/2020		10/7/2020	
		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft	
Analyte	OSD Screening Level *	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Soil, PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (µg/Kg)																					
6:2 FTS	-	ND		ND		ND		ND		0.021	J	ND		ND		ND		ND		ND	
8:2 FTS	-	ND		ND		ND		ND		ND		ND		0.103	J	ND		ND		ND	
NEtFOSAA	-	0.00995	J	ND		ND		ND		ND		ND		ND		ND		ND		ND	
NMeFOSAA	-	ND		ND		ND		ND		ND		ND		ND		ND		ND		ND	
PFBA	-	ND		ND		ND		ND		ND		ND		0.181	J	ND		ND		ND	
PFBS	130000	ND		ND		ND		ND		0.178	J	ND		0.103	J	ND		ND		ND	
PFDA	-	ND		ND		ND		ND		ND		ND		0.024	J	ND		ND		ND	
PFDoA	-	ND		ND		ND		ND		ND		ND		ND		ND		ND		ND	
PFHpA	-	0.021	J	ND		ND		ND		0.04	J	ND		0.698	J	ND		ND		ND	
PFHxA	-	ND		0.165	J	0.282	J	ND		1.05	J	ND		0.792	J	ND		ND		ND	
PFHxS	-	0.062	J	0.213	J	0.259	J	0.274	J	0.345	J	ND		5.02		ND		ND		0.278	J
PFNA	-	0.048	J	ND		ND		ND		ND		ND		0.110	J	ND		ND		ND	
PFOA	130	0.08	J	ND		ND		ND		0.043	J	ND		0.473	J	ND		ND		ND	
PFOS	130	0.679	J	0.678	J	ND		0.617	J	0.308	J	ND		12.3		ND		0.438	J	2.91	
PFPeA	-	ND		ND		ND		ND		1.3		ND		0.248	J	ND		ND		ND	
PFTeDA	-	ND		ND		ND		ND		0.012	J	ND		ND		ND		ND		ND	
PFTrDA	-	ND		ND		ND		ND		ND		ND		ND		ND		ND		ND	
PFUnDA	-	ND		ND		ND		ND		ND		ND		ND		ND		ND		ND	

**Grey Fill** Detected concentration exceeded OSD Screening Level

References

a. Assistant Secretary of Defense, 2019. Risk Based Screening Levels Calculated for PFOS, PFOA, PFBS in Groundwater or Soil using USEPA's Regional Screening Level Calculator. HQ=0.1. 15 October 2019. Soil screening levels based on residential scenario for direct ingestion of contaminated soil.

Interpreted Qualifiers

J = Estimated concentration

J+ = Estimated concentration, biased high

UJ = The analyte was not detected at a level greater than or equal to the adjusted detection limit (DL). However, the reported adjusted DL is approximate and may be inaccurate or imprecise.

UXX = The presence or absence of the analyte cannot be substantiated. Acceptance or rejection of the data should be decided by the project team, but exclusion of the data is recommended.

Chemical Abbreviations

6:2 FTS	6:2 fluorotelomer sulfonate
8:2 FTS	8:2 fluorotelomer sulfonate
NEtFOSAA	N-ethyl perfluorooctane- sulfonamidoacetic acid
NMeFOSAA	N-methyl perfluorooctanesulfonamidoacetic acid
PFAS	per- and polyfluoroalkyl substances
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFDoA	perfluorododecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid
PFTeDA	perfluorotetradecanoic acid
PFTrDA	perfluorotridecanoic acid
PFUnDA	perfluoro-n-undecanoic acid

Acronyms and Abbreviations

AOI	Area of Interest
DL	detection limit
DUP	Duplicate
ft	feet
HA	Hand auger
HQ	Hazard quotient
ID	identification
LCMSMS	Liquid Chromatography Mass Spectrometry
LOD	Limit of Detection
ND	Analyte not detected above the LOD
OSD	Office of the Secretary of Defense
QSM	Quality Systems Manual
Qual	Interpreted Qualifier
SB	Soil boring
SS	Surface Soil
USEPA	United States Environmental Protection Agency
µg/Kg	micrograms per Kilogram
-	Not applicable

**Table 6-2**  
**PFAS Detections in Surface Soil**  
**Site Inspection Report, Fort William Henry Harrison**

Area of Interest		AOI03					
Sample ID		AOI03-SS4-00-02		AOI03-SS4-00-02-DUP		AOI03-SS5-00-02	
Sample Date		10/07/2020		10/07/2020		10/07/2020	
Depth		0 - 2 ft		0 - 2 ft		0 - 2 ft	
Analyte	OSD Screening Level <sup>a</sup>	Result	Qual	Result	Qual	Result	Qual
<b>Soil, PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (µg/Kg)</b>							
6:2 FTS	-	ND		ND		ND	
8:2 FTS	-	ND		ND		ND	
NEtFOSAA	-	ND		ND		ND	
NMeFOSAA	-	ND		ND		ND	
PFBA	-	ND		ND		ND	
PFBS	130000	ND		ND		ND	
PFDA	-	ND		ND		ND	
PFDoA	-	ND		ND		ND	
PFHpA	-	ND		ND		ND	
PFHxA	-	ND		ND		ND	
PFHxS	-	ND		ND		ND	
PFNA	-	ND		ND		ND	
PFOA	130	ND		ND		ND	
PFOS	130	0.764	J	0.936	J	0.215	J
PFPeA	-	ND		ND		ND	
PFTeDA	-	ND		ND		ND	
PFTIDA	-	ND		ND		ND	
PFUnDA	-	ND		ND		ND	

**Grey Fill** Detected concentration exceeded OSD Screening Level

References

a. Assistant Secretary of Defense, 2019. Risk Based Screening Levels Calculated for PFOS, PFOA, PFBS in Groundwater or Soil using USEPA's Regional Screening Level Calculator. HQ=0.1. 15 October 2019. Soil screening levels based on residential scenario for direct ingestion of contaminated soil.

Interpreted Qualifiers

J = Estimated concentration

J+ = Estimated concentration, biased high

UJ = The analyte was not detected at a level greater than or equal to the adjusted detection limit (DL). However, the reported adjusted DL is approximate and may be inaccurate or imprecise.

UXX = The presence or absence of the analyte cannot be substantiated. Acceptance or rejection of the data should be decided by the project team, but exclusion of the data is recommended.

Chemical Abbreviations

6:2 FTS	6:2 fluorotelomer sulfonate
8:2 FTS	8:2 fluorotelomer sulfonate
NEtFOSAA	N-ethyl perfluorooctane- sulfonamidoacetic acid
NMeFOSAA	N-methyl perfluorooctanesulfonamidoacetic acid
PFAS	per- and polyfluoroalkyl substances
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorododecanoic acid
PFDoA	perfluorododecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid
PFTeDA	perfluorotetradecanoic acid
PFTIDA	perfluorotridecanoic acid
PFUnDA	perfluoro-n-undecanoic acid

Acronyms and Abbreviations

AOI	Area of Interest
DL	detection limit
DUP	Duplicate
ft	feet
HA	Hand auger
HQ	Hazard quotient
ID	identification
LCMSMS	Liquid Chromatography Mass Spectrometry
LOD	Limit of Detection
ND	Analyte not detected above the LOD
OSD	Office of the Secretary of Defense
QSM	Quality Systems Manual
Qual	Interpreted Qualifier
SB	Soil boring
SS	Surface Soil
USEPA	United States Environmental Protection Agency
µg/Kg	micrograms per Kilogram
-	Not applicable

**Table 6-3**  
**PFAS Detections in Shallow Subsurface Soil**  
**Site Inspection Report, Fort William Henry Harrison**

Area of Interest Sample ID Sample Date Depth		AOI01						AOI02													
		AOI1-HA1-2-4		AOI1-HA2-2-4		AOI2-HA1-2-4		AOI2-HA2-2-4		AOI2-HA2-2-4-DUP		AOI2-HA3-2-4		AOI2-HA4-2-4		AOI2-HA5-2-4		AOI2-HA6-2-4		AOI2-HA6-2-4-DUP	
		02/12/2019		02/12/2019		02/13/2019		02/13/2019		2/13/2019		02/13/2019		02/13/2019		02/13/2019		02/12/2019		02/12/2019	
		2 - 4 ft		2 - 4 ft		2 - 4 ft		2 - 4 ft		2 - 4 ft		2 - 4 ft		2 - 4 ft		2 - 4 ft		2 - 4 ft		2 - 4 ft	
Analyte	OSD Screening Level *	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
<b>Soil, PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (µg/Kg)</b>																					
6:2 FTS	-	0.058	J	0.041	J	ND		0.041	J	ND		0.046	J	0.026	J	ND		0.019	J	ND	
NEIFOSAA	-	0.018	J	ND		ND		ND		ND		ND		ND		ND		ND		ND	
PFBA	-	ND		ND		ND		ND		0.069	J	0.168	J	ND		ND		ND		ND	
PFBS	1600000	0.00547	J	ND		0.0085	J	ND		0.00808	J	0.027	J	ND		0.047	J	0.036	J	0.031	J
PFDA	-	ND		ND		ND		ND		ND		0.015	J	ND		ND		ND		0.021	J
PFDoA	-	0.013	J	ND		ND		ND		ND		ND		ND		0.018	J	ND		ND	
PFHpA	-	0.01	J	ND		ND		ND		0.011	J	0.022	J	0.054	J	ND		0.072	J	0.054	J
PFHxA	-	0.061	J	0.035	J	ND		0.057	J	ND		0.146	J	0.141	J	0.144	J	0.263	J	0.22	J
PFHxS	-	ND		ND		0.129	J	ND		0.011	J	ND		0.091	J	0.307	J	0.285	J	0.25	J
PFNA	-	ND		ND		ND		ND		ND		ND		0.037	J	0.043	J	0.019	J	ND	
PFOA	1600	ND		ND		ND		ND		ND		ND		0.083	J	ND		0.087	J	0.081	J
PFOS	1600	ND		ND		0.135	J	ND		0.032	J	0.12	J	0.326	J	1.92		0.572	J	0.489	J
PFPeA	-	ND		ND		ND		ND		ND		0.116	J	ND		ND		0.143	J	0.093	J
PFTeDA	-	ND		ND		ND		ND		ND		ND		0.022	J	0.013	J	ND		ND	

Grey Fill Detected concentration exceeded OSD Screening Levels

#### References

a. Assistant Secretary of Defense, 2019. Risk Based Screening Levels Calculated for PFOS, PFOA, PFBS in Groundwater or Soil using USEPA's Regional Screening Level Calculator. HQ=0.1. 15 October 2019. Soil screening levels based on industrial/commercial composite worker scenario for incidental ingestion of contaminated soil.

#### Interpreted Qualifiers

J = Estimated concentration

#### Chemical Abbreviations

6:2 FTS	6:2 fluorotelomer sulfonate
NEIFOSAA	N-ethyl perfluorooctane- sulfonamidoacetic acid
PFAS	per- and polyfluoroalkyl substances
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFDoA	perfluorododecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid
PFTeDA	perfluorotetradecanoic acid

#### Acronyms and Abbreviations

AOI	Area of Interest
DUP	Duplicate
ft	feet
HA	Hand auger
HQ	Hazard quotient
ID	Identification
LOD	Limit of Detection
LCMSMS	Liquid Chromatography Mass Spectrometry
ND	Analyte not detected above the LOD
OSD	Office of the Secretary of Defense
QSM	Quality Systems Manual
Qual	Interpreted Qualifier
SB	Soil boring
USEPA	United States Environmental Protection Agency
µg/Kg	micrograms per Kilogram
-	Not applicable

**Table 6-3**  
**PFAS Detections in Shallow Subsurface Soil**  
**Site Inspection Report, Fort William Henry Harrison**

Area of Interest		AOI02								AOI03	
		AOI2-SB1-9-11		AOI2-SB2-8-10		AOI02-03-SB-10-12		AOI02-03-SB-10-12-DUP		AOI3-HA1-2-4	
		Sample ID		Sample ID		Sample ID		Sample ID		Sample ID	
		Sample Date		Sample Date		Sample Date		Sample Date		Sample Date	
Depth		9 - 11 ft		8 - 10 ft		10 - 12 ft		10 - 12 ft		2 - 4 ft	
Analyte	OSD Screening Level *	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
<b>Soil, PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (ug/Kg)</b>											
6:2 FTS	-	ND		0.019	J	ND		ND		ND	
NEIFOSAA	-	ND		ND		ND		ND		ND	
PFBA	-	ND		ND		ND		ND		ND	
PFBS	1600000	ND		ND		ND		ND		0.00739	J
PFDA	-	ND		ND		ND		ND		ND	
PFDoA	-	ND		ND		ND		ND		ND	
PFHpA	-	ND		ND		ND		ND		ND	
PFHxA	-	ND		ND		ND		ND		ND	
PFHxS	-	0.012	J	0.212	J	ND		ND		0.06	J
PFNA	-	ND		0.00501	J	ND		ND		ND	
PFOA	1600	ND		ND		ND		ND		0.034	J
PFOS	1600	0.046	J	0.161	J	ND		ND		0.244	J
PFPeA	-	ND		ND		ND		ND		ND	
PFTeDA	-	ND		ND		ND		ND		ND	

Grey Fill Detected concentration exceeded OSD Screening Levels

#### References

a. Assistant Secretary of Defense, 2019. Risk Based Screening Levels Calculated for PFOS, PFOA, PFBS in Groundwater or Soil using USEPA's Regional Screening Level Calculator. HQ=0.1. 15 October 2019. Soil screening levels based on industrial/commercial composite worker scenario for incidental ingestion of contaminated soil.

#### Interpreted Qualifiers

J = Estimated concentration

#### Chemical Abbreviations

6:2 FTS	6:2 fluorotelomer sulfonate
NEIFOSAA	N-ethyl perfluorooctane- sulfonamidoacetic acid
PFAS	per- and polyfluoroalkyl substances
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFDoA	perfluorododecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid
PFTeDA	perfluorotetradecanoic acid

#### Acronyms and Abbreviations

AOI	Area of Interest
DUP	Duplicate
ft	feet
HA	Hand auger
HQ	Hazard quotient
ID	identification
LOD	Limit of Detection
LCMSMS	Liquid Chromatography Mass Spectrometry
ND	Analyte not detected above the LOD
OSD	Office of the Secretary of Defense
QSM	Quality Systems Manual
Qual	Interpreted Qualifier
SB	Soil boring
USEPA	United States Environmental Protection Agency
µg/Kg	micrograms per Kilogram
-	Not applicable

**Table 6-4**  
**PFAS Detections in Deep Subsurface Soil**  
**Site Inspection Report, Fort William Henry Harrison**

Area of Interest Sample ID Sample Date Depth	AOI01																	
	AOI1-SB1-20-22		AOI1-SB1-38-40		AOI1-SB2-15-17		AOI1-SB2-28-30		AOI1-SB3-18-20		AOI1-SB3-18-20-DUP		AOI1-SB3-38-40		AOI01-04-SB-15-17		AOI01-04-SB-30-32	
	02/13/2019		02/13/2019		02/15/2019		02/15/2019		02/20/2019		02/20/2019		02/20/2019		10/09/2020		10/09/2020	
	20 - 22 ft		38 - 40 ft		15 - 17 ft		28 - 30 ft		18 - 20 ft		18 - 20 ft		38 - 40 ft		15 - 17 ft		30 - 32 ft	
Analyte	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
<b>Soil, PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (µg/Kg)</b>																		
6:2 FTS	0.051	J	ND		ND		ND		ND		ND		ND		ND		ND	
8:2 FTS	ND		ND		ND		ND		0.117	J	ND		ND		ND		ND	
NEtFOSAA	ND		ND		ND		ND		0.135	J	ND		0.025	J	ND		ND	
NMeFOSAA	ND		ND		ND		ND		0.136	J	ND		0.02	J	ND		ND	
PFBA	0.00848	J	ND		ND		ND		ND		ND		ND		ND		ND	
PFBS	0.00418	J	ND		0.142	J	ND		0.021	J	ND		ND		ND		ND	
PFDA	0.014	J	0.013	J	ND		ND		ND		ND		ND		ND		ND	
PFDoA	0.00994	J	ND		ND		ND		0.233	J	ND		0.013	J	ND		ND	
PFHpA	ND		ND		ND		ND		0.021	J	0.00431	J	0.011	J	ND		ND	
PFHxA	0.035	J	ND		0.226	J	0.059	J	ND		ND		ND		ND		ND	
PFHxS	ND		ND		0.916	J	ND		0.034	J	ND		0.033	J	ND		ND	
PFOA	ND		ND		0.055	J	ND		ND		ND		ND		ND		ND	
PFOS	0.039	J	0.014	J	0.478	J	ND		0.526	J	ND		0.135	J	ND		ND	
PFPeA	ND		ND		ND		ND		ND		ND		ND		ND		ND	
PFTeDA	ND		ND		ND		ND		0.13	J	0.012	J	0.015	J	ND		ND	
PFTTrDA	ND		ND		ND		ND		0.238	J	0.00534	J	ND		ND		ND	
PFUnDA	0.00496	J	ND		ND		ND		0.14	J	ND		ND		ND		ND	

Interpreted Qualifiers

J = Estimated concentration

Chemical Abbreviations

6:2 FTS	6:2 fluorotelomer sulfonate
8:2 FTS	8:2 fluorotelomer sulfonate
NEtFOSAA	N-ethyl perfluorooctane- sulfonamidoacetic acid
NMeFOSAA	N-methyl perfluorooctanesulfonamidoacetic acid
PFAS	per- and polyfluoroalkyl substances
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFDoA	perfluorododecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid
PFTeDA	perfluorotetradecanoic acid
PFTTrDA	perfluorotridecanoic acid
PFUnDA	perfluoro-n-undecanoic acid

Acronyms and Abbreviations

AOI	Area of Interest
DUP	Duplicate
ft	feet
ID	identification
LCMSMS	Liquid Chromatography Mass Spectrometry
LOD	Limit of Detection
ND	Analyte not detected above the LOD
QSM	Quality Systems Manual
Qual	Interpreted Qualifier
SB	Soil boring
µg/Kg	micrograms per Kilogram

**Table 6-4**  
**PFAS Detections in Deep Subsurface Soil**  
**Site Inspection Report, Fort William Henry Harrison**

Area of Interest	AOI01								AOI02						AOI03				
	Sample ID	AOI01-05-SB-15-17		AOI01-05-SB-30-32		AOI01-06-SB-15-17		AOI01-06-SB-30-32		AOI02-SB1-18-20		AOI02-SB2-18-20		AOI02-03-SB-25-27		AOI03-SB1-18-20		AOI03-SB1-40-42	
	Sample Date	10/08/2020		10/08/2020		10/09/2020		10/09/2020		05/21/2019		05/23/2019		10/10/2020		05/22/2019		05/22/2019	
	Depth	15 - 17 ft		30 - 32 ft		15 - 17 ft		30 - 32 ft		18 - 20 ft		18 - 20 ft		25 - 27 ft		18 - 20 ft		40 - 42 ft	
Analyte									Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	
Soil, PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (µg/Kg)																			
6:2 FTS	ND		ND		ND		ND		ND		0.014	J	ND		ND		ND		
8:2 FTS	ND		ND		ND		ND		ND		0.00707	J	ND		ND		ND		
NEtFOSAA	ND		ND		ND		ND		ND		ND		ND		ND		ND		
NMeFOSAA	ND		ND		ND		ND		ND		ND		ND		ND		ND		
PFBA	ND		ND		ND		ND		ND		ND		ND		ND		0.059	J	
PFBS	ND		ND		ND		ND		ND		0.00186	J	ND		ND		0.147	J	
PFDA	ND		ND		ND		ND		ND		ND		ND		ND		ND		
PFDoA	ND		ND		ND		ND		ND		ND		ND		ND		ND		
PFHpA	ND		ND		ND		ND		ND		ND		ND		ND		0.022	J	
PFHxA	ND		ND		ND		ND		ND		ND		ND		0.046	J	0.314	J	
PFHxS	ND		ND		ND		ND		ND		0.029	J	ND		0.00812	J	0.128	J	
PFOA	ND		ND		ND		ND		ND		ND		ND		ND		ND		
PFOS	ND		ND		ND		ND		0.00678	J	ND		0.237	J	0.056	J	0.021	J	
PFPeA	ND		ND		ND		ND		ND		ND		ND		ND		0.129	J	
PFTeDA	ND		ND		ND		ND		ND		ND		ND		ND		ND		
PFTriDA	ND		ND		ND		ND		ND		ND		ND		ND		ND		
PFUnDA	ND		ND		ND		ND		ND		ND		ND		ND		ND		

Interpreted Qualifiers

J = Estimated concentration

Chemical Abbreviations

6:2 FTS	6:2 fluorotelomer sulfonate
8:2 FTS	8:2 fluorotelomer sulfonate
NEtFOSAA	N-ethyl perfluorooctane- sulfonamidoacetic acid
NMeFOSAA	N-methyl perfluorooctanesulfonamidoacetic acid
PFAS	per- and polyfluoroalkyl substances
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFDoA	perfluorododecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid
PFTeDA	perfluorotetradecanoic acid
PFTTrDA	perfluorotridecanoic acid
PFUnDA	perfluoro-n-undecanoic acid

Acronyms and Abbreviations

AOI	Area of Interest
DUP	Duplicate
ft	feet
ID	identification
LCMSMS	Liquid Chromatography Mass Spectrometry
LOD	Limit of Detection
ND	Analyte not detected above the LOD
QSM	Quality Systems Manual
Qual	Interpreted Qualifier
SB	Soil boring
µg/Kg	micrograms per Kilogram



**Table 6-5**  
**PFAS Detections in Groundwater**  
**Site Inspection Report, Fort William Henry Harrison**

Area of Interest Sample ID Sample Date		AOI01																			
		AOI1-MW1		AOI1-MW1-GW		AOI1-MW2		AOI1-MW2-DUP		AOI1-MW2-GW		AOI1-MW3		AOI1-MW3-GW		AOI1-MW3-GW-DUP		AOI01-MW04-GW		AOI01-MW05-GW	
		05/28/2019		10/11/2020		05/29/2019		05/29/2019		10/12/2020		05/25/2019		10/10/2020		10/10/2020		10/14/2020		10/12/2020	
Analyte	OSD Screening Level *	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Water, PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (ng/L)																					
6:2 FTS	-	ND		ND		ND		ND		ND		3.24	J	ND		ND		ND		ND	
PFBA	-	4.52	J	ND		8.34	J	9.18		17.2		30.2		25.9		27.1		2.90	J	18.4	
PFBS	40000	3.16	J	3.00	J	4.52	J	4.74	J	11.2		34.1		23.1		25.8		3.24	J	21.7	
PFDA	-	ND	UJ	ND		ND		ND		ND	UJ	ND		ND		ND		ND		ND	
PFHpA	-	1.83	J	ND		4.00	J	3.84	J	4.90	J	22.4		23.0		23.8		ND		11.5	
PFHxA	-	7.81		4.32	J	15.2		15.2		33.4		80.9		72.6		84.2		5.05	J	53.3	
PFHxS	-	22.3		21.0		33.9		34.3		18.0		213		184	J+	197	J+	12.2		77.0	
PFNA	-	ND		ND		ND		ND		ND		ND		ND		ND		ND		ND	
PFOA	40	1.17	J	2.10	J	4.58	J	4.43	J	2.75	J	12.4	J+	13.5		14.3		2.34	J	8.19	J
PFOS	40	8.82		5.53	J	29.2		27.3		25.4		24.8		62.2		61.6		5.26	J	34.4	
PFPeA	-	9.46		4.68	J	16.7		16.7		47.3		103		78.6		88.6		6.51	J	56.5	

Grey Fill Detected concentration exceeded OSD Screening Level

#### References

a. Assistant Secretary of Defense, 2019. Risk Based Screening Levels Calculated for PFOS, PFOA, PFBS in Groundwater or Soil using USEPA's Regional Screening Level Calculator. HQ=0.1. 15 October 2019. Groundwater screening levels based on residential scenario for direct ingestion of groundwater.

#### Interpreted Qualifiers

J = Estimated concentration  
J- = Estimated concentration, biased low  
J+ = Estimated concentration, biased high  
UJ = The analyte was not detected at a level greater than or equal to the adjusted DL. However, the reported adjusted DL is approximate and may be inaccurate or imprecise.

#### Chemical Abbreviations

6:2 FTS	6:2 fluorotelomer sulfonate
PFAS	per- and polyfluoroalkyl substances
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid

#### Acronyms and Abbreviations

AOI	Area of Interest
DL	detection limit
DUP	Duplicate
GW	Groundwater
HQ	Hazard quotient
ID	identification
LCMSMS	Liquid Chromatography Mass Spectrometry
LOD	Limit of Detection
MW	monitoring well
ND	Analyte not detected above the LOD
OSD	Office of the Secretary of Defense
QSM	Quality Systems Manual
Qual	Interpreted Qualifier
USEPA	United States Environmental Protection Agency
ng/L	nanogram per liter
-	Not applicable

**Table 6-5**  
**PFAS Detections in Groundwater**  
**Site Inspection Report, Fort William Henry Harrison**

Area of Interest Sample ID Sample Date		AOI01										AOI02									
		AOI01-MW06-GW		BH-02		BH-02-101020		FH-02		FH-02-101120		AOI2-MW1		AOI2-MW1-GW		AOI2-MW1-GW-DUP		AOI2-MW2		AOI2-MW2-GW	
		10/13/2020		05/28/2019		10/10/2020		05/28/2019		10/11/2020		05/29/2019		10/12/2020		10/12/2020		5/30/2019		10/13/2020	
Analyte	OSD Screening Level *	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
<b>Water, PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (ng/L)</b>																					
6:2 FTS	-	ND		ND		ND		ND		ND		ND		ND		ND		ND		ND	
PFBA	-	11.6		6.30		4.02	J	7.59		6.42	J	36.2		41.6		43.2		3.74	J	ND	
PFBS	40000	14.7		1.66	J	ND		2.65	J	2.06	J	27.3		16.5		17.5		1.36	J	ND	
PFDA	-	ND		1.74	J	ND		ND		ND		ND		ND		ND		ND		ND	
PFHpA	-	15.7		2.69	J	ND		3.97	J	3.90	J	19.0		21.8		23.0		ND		ND	
PFHxA	-	25.2		10.2		7.25	J	13.8		11.6		102	J-	108		109		3.03	J	ND	
PFHxS	-	114		5.06		4.89	J	16.7		20.4		155	J-	154		153		27.6		1.86	J
PFNA	-	1.71	J	0.861	J	ND		ND		ND		1.86	J	ND		ND		ND		ND	
PFOA	40	9.16	J	4.68	J+	ND		7.31	J+	7.25	J	10.7	J+	12.6		14.6		3.07	J+	ND	
PFOS	40	34.2		6.88		2.61	J	9.25		8.74	J	118		89.4		110		9.14		4.67	J
PFPeA	-	21.6		10.2		7.30	J	16.5		13.1		121		151		153		ND		ND	

Grey Fill Detected concentration exceeded OSD Screening Level

#### References

a. Assistant Secretary of Defense, 2019. Risk Based Screening Levels Calculated for PFOS, PFOA, PFBS in Groundwater or Soil using USEPA's Regional Screening Level Calculator. HQ=0.1. 15 October 2019. Groundwater screening levels based on residential scenario for direct ingestion of groundwater.

#### Interpreted Qualifiers

J = Estimated concentration  
J- = Estimated concentration, biased low  
J+ = Estimated concentration, biased high  
UJ = The analyte was not detected at a level greater than or equal to the adjusted detection limit (DL). However, the reported adjusted DL is approximate and may be inaccurate or imprecise.

#### Chemical Abbreviations

6:2 FTS	6:2 fluorotelomer sulfonate
PFAS	per- and polyfluoroalkyl substances
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid

#### Acronyms and Abbreviations

AOI	Area of Interest
DL	detection limit
DUP	Duplicate
GW	Groundwater
HQ	Hazard quotient
ID	identification
LCMSMS	Liquid Chromatography Mass Spectrometry
LOD	Limit of Detection
MW	monitoring well
ND	Analyte not detected above the LOD
OSD	Office of the Secretary of Defense
QSM	Quality Systems Manual
Qual	Interpreted Qualifier
USEPA	United States Environmental Protection Agency
ng/L	nanogram per liter
-	Not applicable

**Table 6-5**  
**PFAS Detections in Groundwater**  
**Site Inspection Report, Fort William Henry Harrison**

Area of Interest Sample ID Sample Date		AOI02										AOI03									
		AOI02-MW03-GW		MW-06		MW-06-DUP		MW-07		MW-08		MW-08-101120		AOI3-MW1		AOI3-MW1-GW		AOI03-MW02-GW		MW-10	
		10/14/2020		05/29/2019		05/29/2019		05/30/2019		05/29/2019		10/11/2020		05/29/2019		10/09/2020		10/13/2020		05/29/2019	
Analyte	OSD Screening Level *	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Water, PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (ng/L)																					
6:2 FTS	-	ND		ND		ND		ND		ND		ND		ND		ND		ND		ND	
PFBA	-	39.2		10.4		ND		ND		45.3		45.8		14.8		4.84	J	ND		3.38	J
PFBS	40000	17.2		ND		ND		ND		20.9		14.6		59.2		18.5		2.07	J	ND	
PFDA	-	ND		ND		ND		ND		ND		ND		ND		ND		ND		ND	
PFHpA	-	24.6		ND		ND		ND		20.6		25.3		1.60	J	ND		ND		2.47	J
PFHxA	-	87.2		ND		1.82	J	1.74	J	112		116		48.7		16.8		2.40	J	3.52	J
PFHxS	-	113		1.99	J	ND		2.17	J	69.9		88.3		5.66	J	3.91	J	5.86	J	2.66	J
PFNA	-	ND		ND		ND		ND		ND		ND		ND		ND		ND		ND	
PFOA	40	10.0		ND		ND		ND		10.8	J+	12.8		ND		ND		ND		1.71	J+
PFOS	40	6.29	J	1.83	J	ND		ND		8.74		8.50	J	1.63	J	2.28	J	2.32	J	ND	
PFPeA	-	152		ND		ND		ND		171		178		15.4		5.85	J	ND		4.65	J

Grey Fill Detected concentration exceeded OSD Screening Level

#### References

a. Assistant Secretary of Defense, 2019. Risk Based Screening Levels Calculated for PFOS, PFOA, PFBS in Groundwater or Soil using USEPA's Regional Screening Level Calculator. HQ=0.1. 15 October 2019. Groundwater screening levels based on residential scenario for direct ingestion of groundwater.

#### Interpreted Qualifiers

J = Estimated concentration  
J- = Estimated concentration, biased low  
J+ = Estimated concentration, biased high  
UJ = The analyte was not detected at a level greater than or equal to the adjusted detection limit (DL). However, the reported adjusted DL is approximate and may be inaccurate or imprecise.

#### Chemical Abbreviations

6:2 FTS	6:2 fluorotelomer sulfonate
PFAS	per- and polyfluoroalkyl substances
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid

#### Acronyms and Abbreviations

AOI	Area of Interest
DL	detection limit
DUP	Duplicate
GW	Groundwater
HQ	Hazard quotient
ID	identification
LCMSMS	Liquid Chromatography Mass Spectrometry
LOD	Limit of Detection
MW	monitoring well
ND	Analyte not detected above the LOD
OSD	Office of the Secretary of Defense
QSM	Quality Systems Manual
Qual	Interpreted Qualifier
USEPA	United States Environmental Protection Agency
ng/L	nanogram per liter
-	Not applicable

**Table 6-5**  
**PFAS Detections in Groundwater**  
**Site Inspection Report, Fort William Henry Harrison**

Area of Interest											
Sample ID		MW-11		MW-11-100920		OBTMW-01		PH-1		PH-2-DUP	
Sample Date		05/30/2019		10/09/2020		05/30/2019		05/30/2019		05/30/2019	
Analyte	OSD Screening Level *	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
<b>Water, PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (ng/L)</b>											
6:2 FTS	-	ND		ND		ND		ND		ND	
PFBA	-	5.03		2.23	J	5.32		ND		ND	
PFBS	40000	ND		ND		ND		ND		ND	
PFDA	-	ND		ND		ND		ND		ND	
PFHpA	-	ND		ND		ND		ND		ND	
PFHxA	-	5.11		2.71	J	1.36	J	ND		ND	
PFHxS	-	2.27	J	ND		0.955	J	ND		ND	
PFNA	-	ND		ND		ND		ND		ND	
PFOA	40	ND		ND		ND		ND		ND	
PFOS	40	ND		ND		1.10	J	ND		ND	
PFPeA	-	6.49		ND		ND		ND		ND	

Grey Fill Detected concentration exceeded OSD Screening Level

#### References

a. Assistant Secretary of Defense, 2019. Risk Based Screening Levels Calculated for PFOS, PFOA, PFBS in Groundwater or Soil using USEPA's Regional Screening Level Calculator. HQ=0.1. 15 October 2019. Groundwater screening levels based on residential scenario for direct ingestion of groundwater.

#### Interpreted Qualifiers

J = Estimated concentration  
 J- = Estimated concentration, biased low  
 J+ = Estimated concentration, biased high  
 UJ = The analyte was not detected at a level greater than or equal to the adjusted detection limit (DL). However, the reported adjusted DL is approximate and may be inaccurate or imprecise.

#### Chemical Abbreviations

6:2 FTS	6:2 fluorotelomer sulfonate
PFAS	per- and polyfluoroalkyl substances
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid

#### Acronyms and Abbreviations

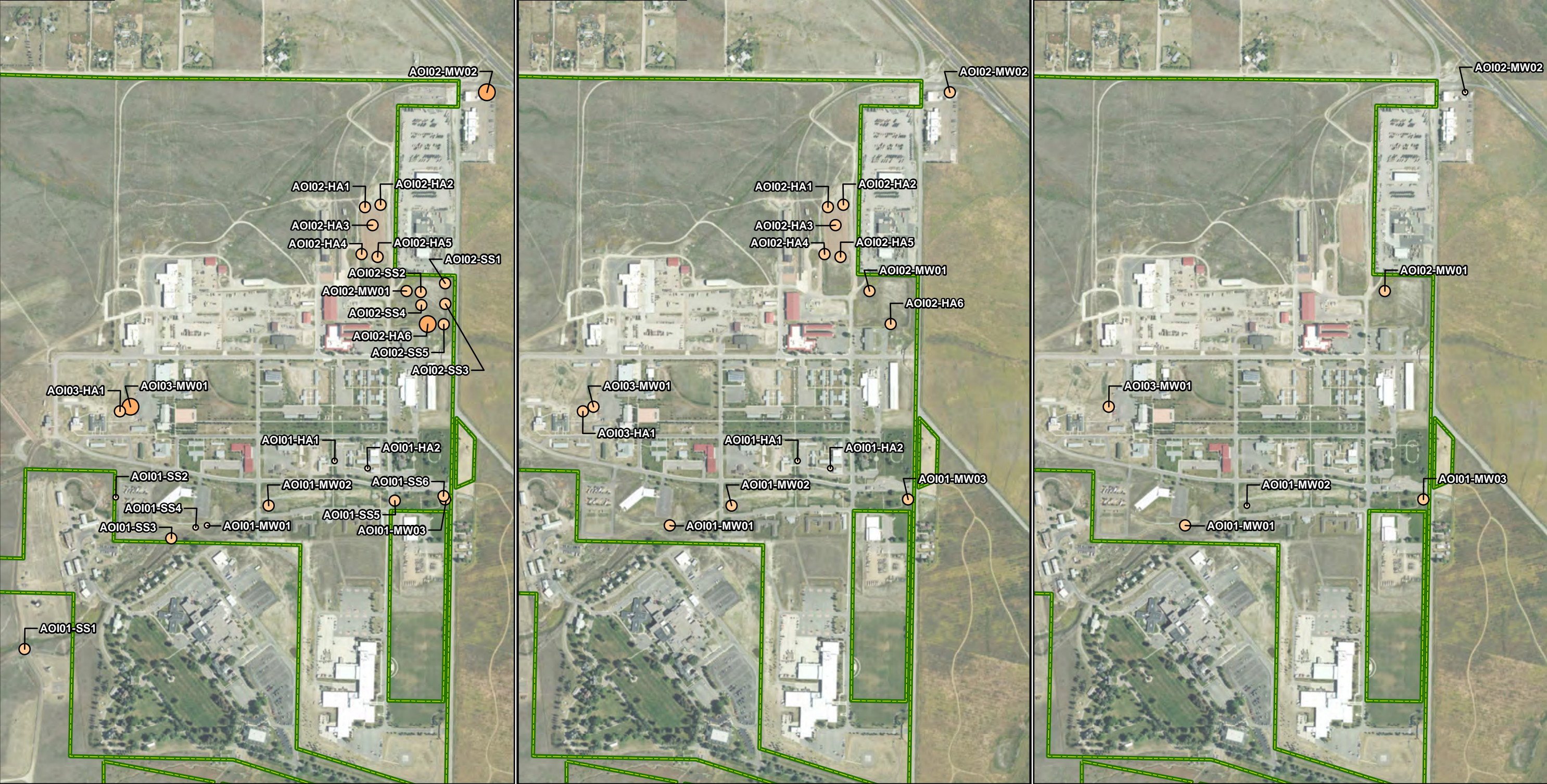
AOI	Area of Interest
DL	detection limit
DUP	Duplicate
GW	Groundwater
HQ	Hazard quotient
ID	identification
LCMSMS	Liquid Chromatography Mass Spectrometry
LOD	Limit of Detection
MW	monitoring well
ND	Analyte not detected above the LOD
OSD	Office of the Secretary of Defense
QSM	Quality Systems Manual
Qual	Interpreted Qualifier
USEPA	United States Environmental Protection Agency
ng/L	nanogram per liter
-	Not applicable



Shallow

Intermediate

Deep



CLIENT	ARNG			
PROJECT	Site Inspection for PFAS at Fort William Henry Harrison, MT			
REVISED	6/7/2021	GIS BY	MS	6/7/2021
SCALE	1:9,360	CHK BY	AB	6/7/2021
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM	CM	6/7/2021

Facility Boundary

PFOS Results (µg/Kg)

- ND
- >ND - 10
- >10 - 130
- >130 - 1,600
- >1,600

0 390 780 1,560 Feet



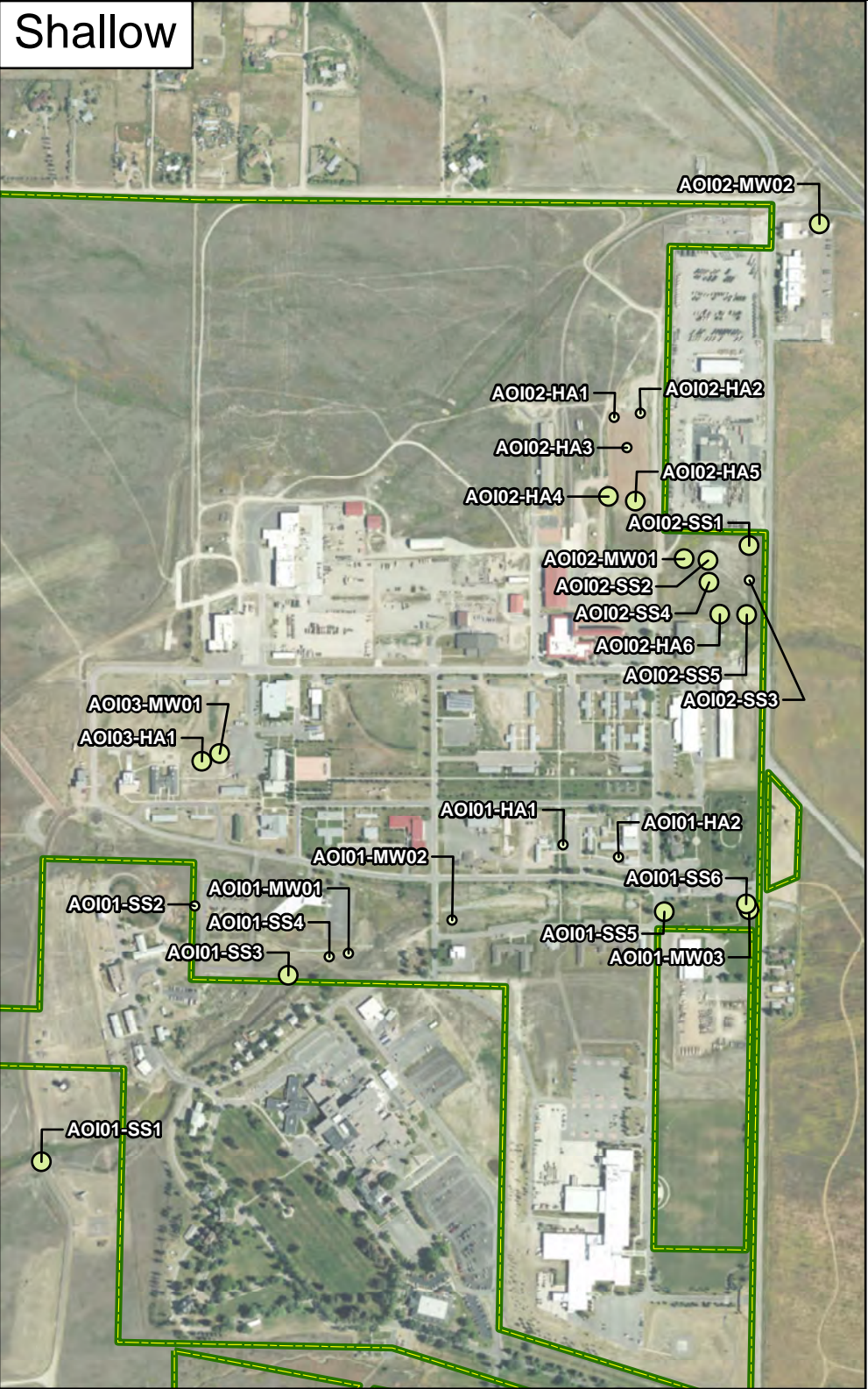
**PFOS Detections in Soil  
During SI Mobilization 1 (AOI 1-3)**

**AECOM** 12420 Milestone Center Drive  
Germantown, MD 20876

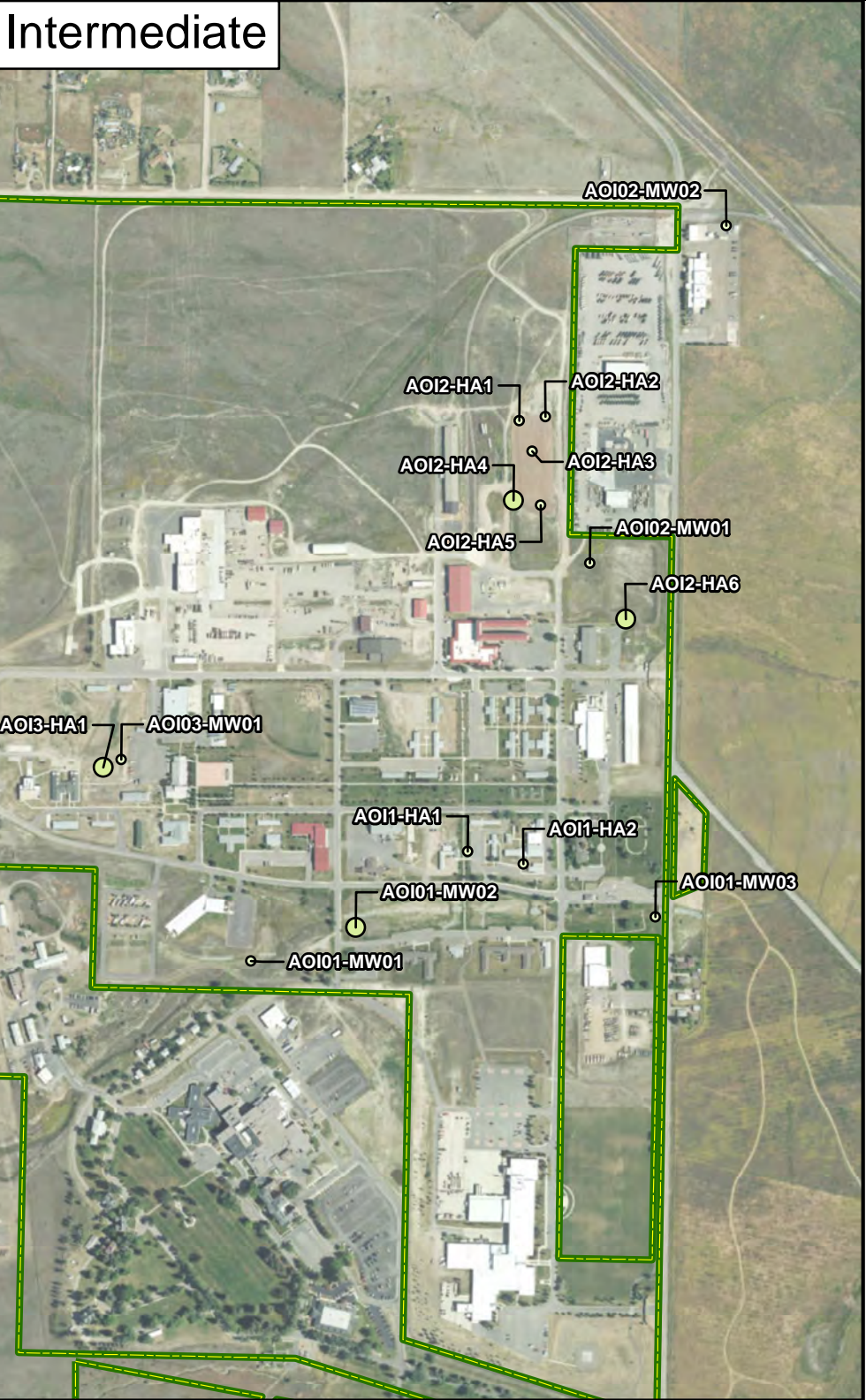
**Figure 6-1**



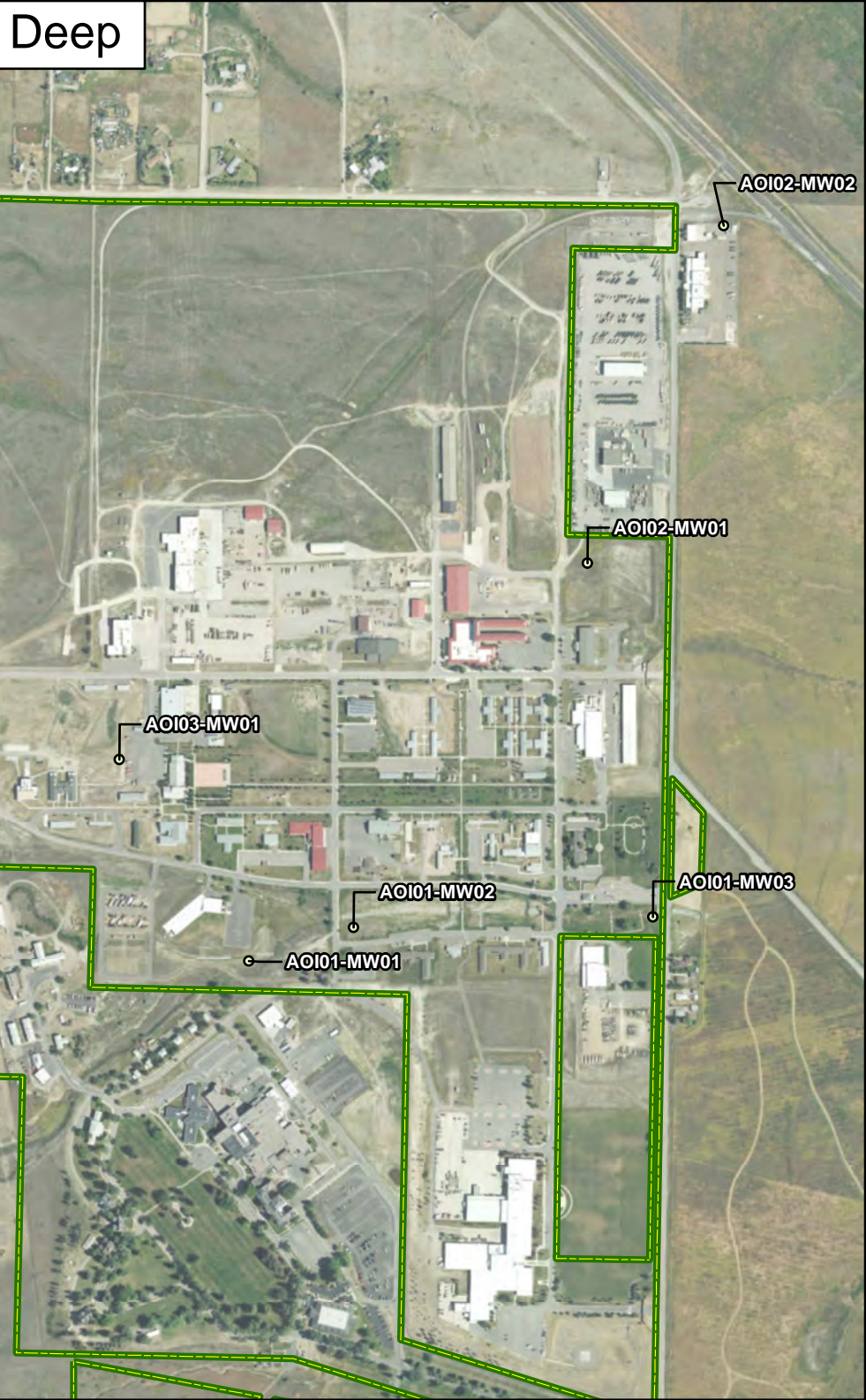
Shallow



Intermediate



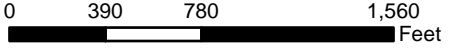
Deep



CLIENT	ARNG			
PROJECT	Site Inspection for PFAS at Fort William Henry Harrison, MT			
REVISED	6/7/2021	GIS BY	MS	6/7/2021
SCALE	1:9,360	CHK BY	JH	6/7/2021
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM	CM	6/7/2021

Facility Boundary

- PFOA Results (µg/Kg)
- ND
  - >ND - 10
  - >10 - 130
  - >130 - 1,600
  - >1,600



**PFOA Detections in Soil  
During SI Mobilization 1 (AOI 1-3)**

**AECOM** 12420 Milestone Center Drive  
Germantown, MD 20876

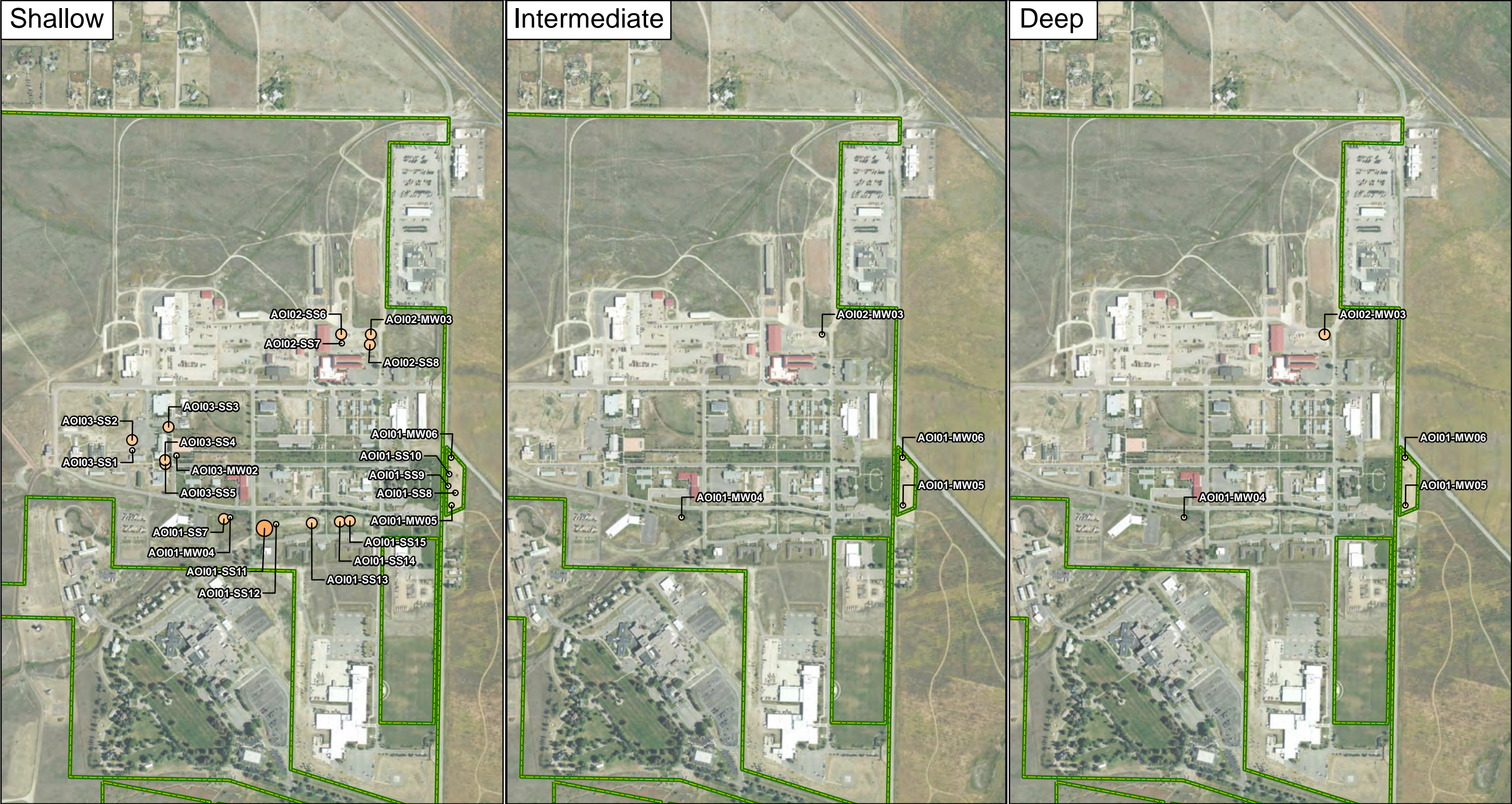
**Figure 6-2**



Shallow

Intermediate

Deep



CLIENT		ARNG		
PROJECT		Site Inspection for PFAS at Fort William Henry Harrison, MT		
REVISED	6/7/2021	GIS BY	MS	6/7/2021
SCALE	1:9,360	CHK BY	AB	6/7/2021
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM	CM	6/7/2021

Facility Boundary

**PFOS Results (µg/Kg)**  
○ ND  
○ >ND - 10  
○ >10 - 130  
○ >130 - 1,600  
○ >1,600

03907801,560

Feet

N

**PFOS Detections in Soil During SI Mobilization 2 (AOI 1-3)**

**AECOM** 12420 Milestone Center Drive  
Germantown, MD 20876

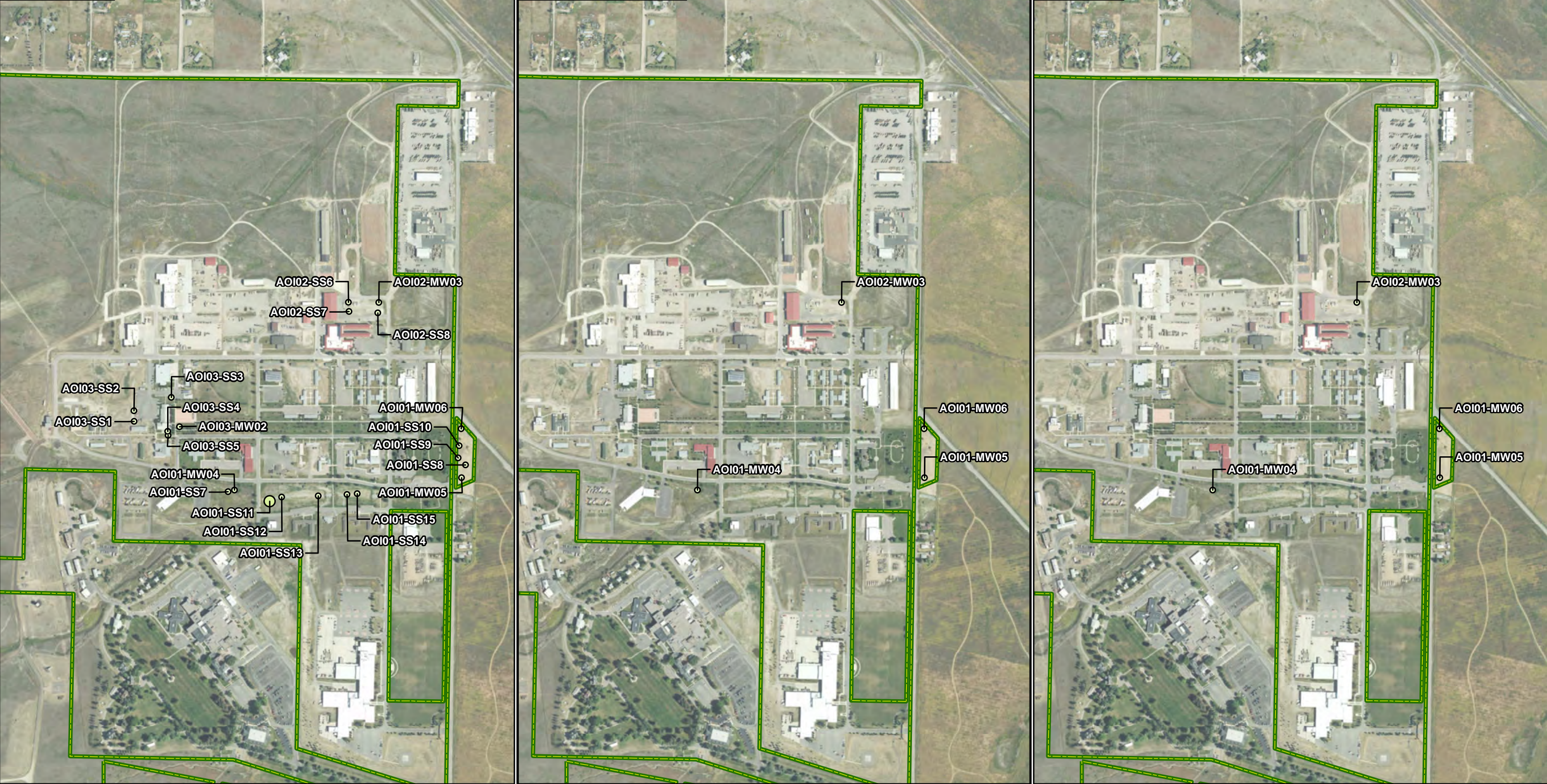
**Figure 6-3**



Shallow

Intermediate

Deep



CLIENT	ARNG			
PROJECT	Site Inspection for PFAS at Fort William Henry Harrison, MT			
REVISED	6/7/2021	GIS BY	MS	6/7/2021
SCALE	1:9,360	CHK BY	JH	6/7/2021
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM	CM	6/7/2021

Facility Boundary

- PFOA Results (µg/Kg)
- ND
  - >ND - 10
  - >10 - 130
  - >130 - 1,600
  - >1,600

0 390 780 1,560 Feet



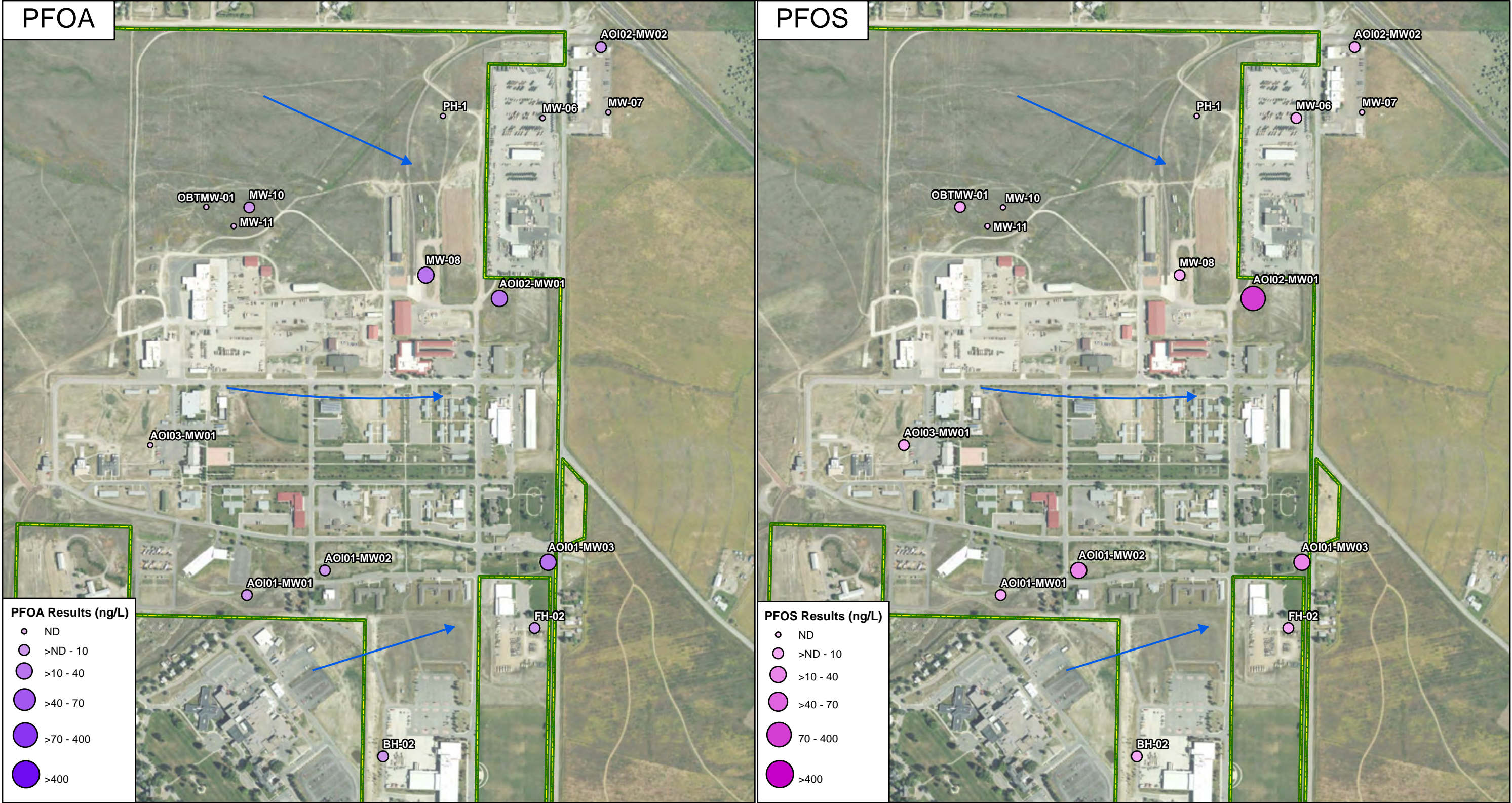
PFOA Detections in Soil  
During SI Mobilization 2 (AOI 1-3)

**AECOM**

12420 Milestone Center Drive  
Germantown, MD 20876

Figure 6-4





CLIENT					ARNG					
PROJECT					Site Inspection for PFAS at Fort William Henry Harrison, MT					
REVISED		6/7/2021		GIS BY		MS		6/7/2021		
SCALE		1:7,200		CHK BY		JH		6/7/2021		
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community					PM		CM		6/7/2021	

**Legend**

- Facility Boundary
- Groundwater Flow Direction

03006001,200

Feet

N

**PFOA and PFOS Detections in Groundwater During SI Mobilization 1 (AOI 1-3) May 25-30, 2019**

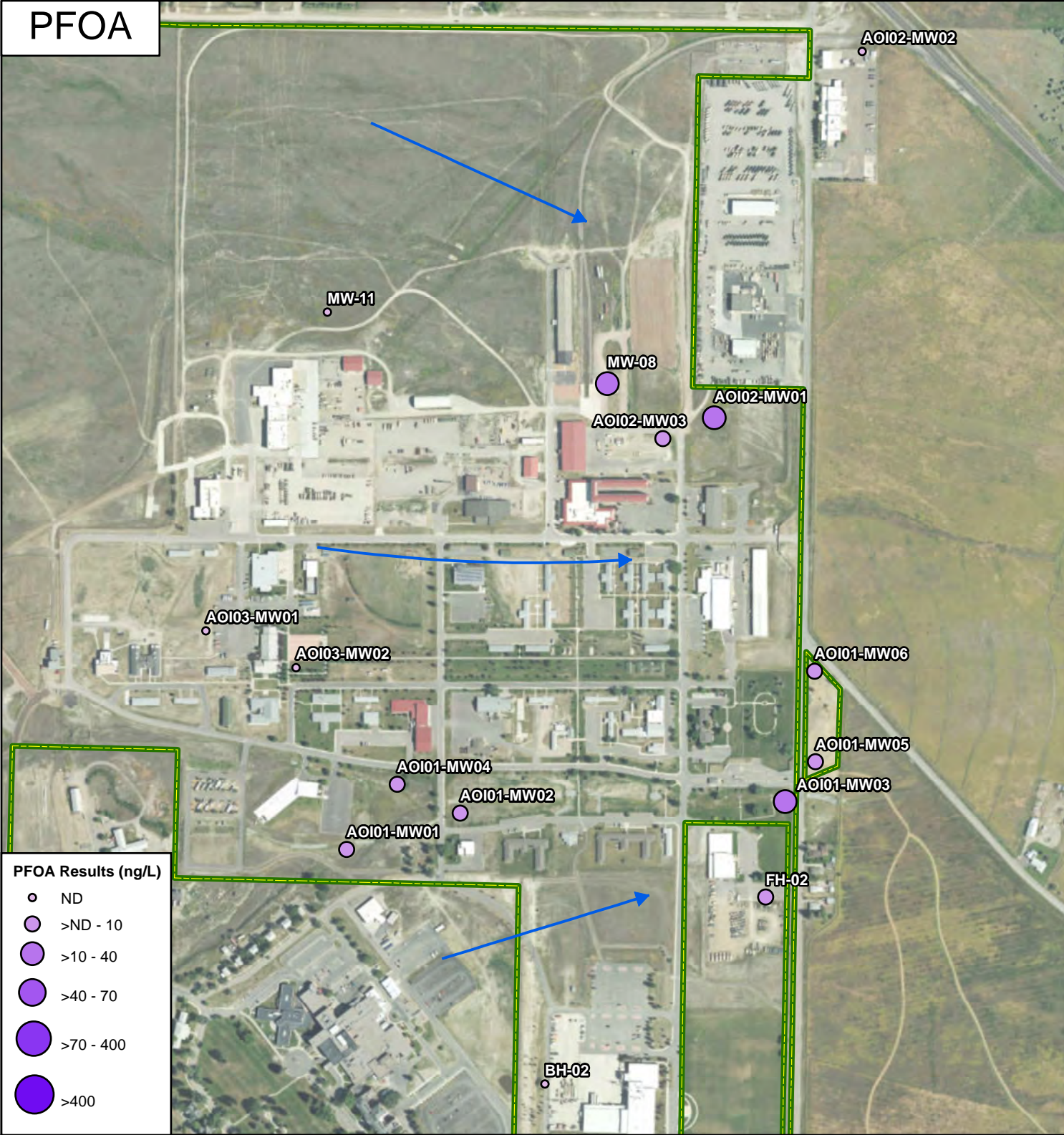
**AECOM**12420 Milestone Center Drive  
Germantown, MD 20876

**Figure 6-5**

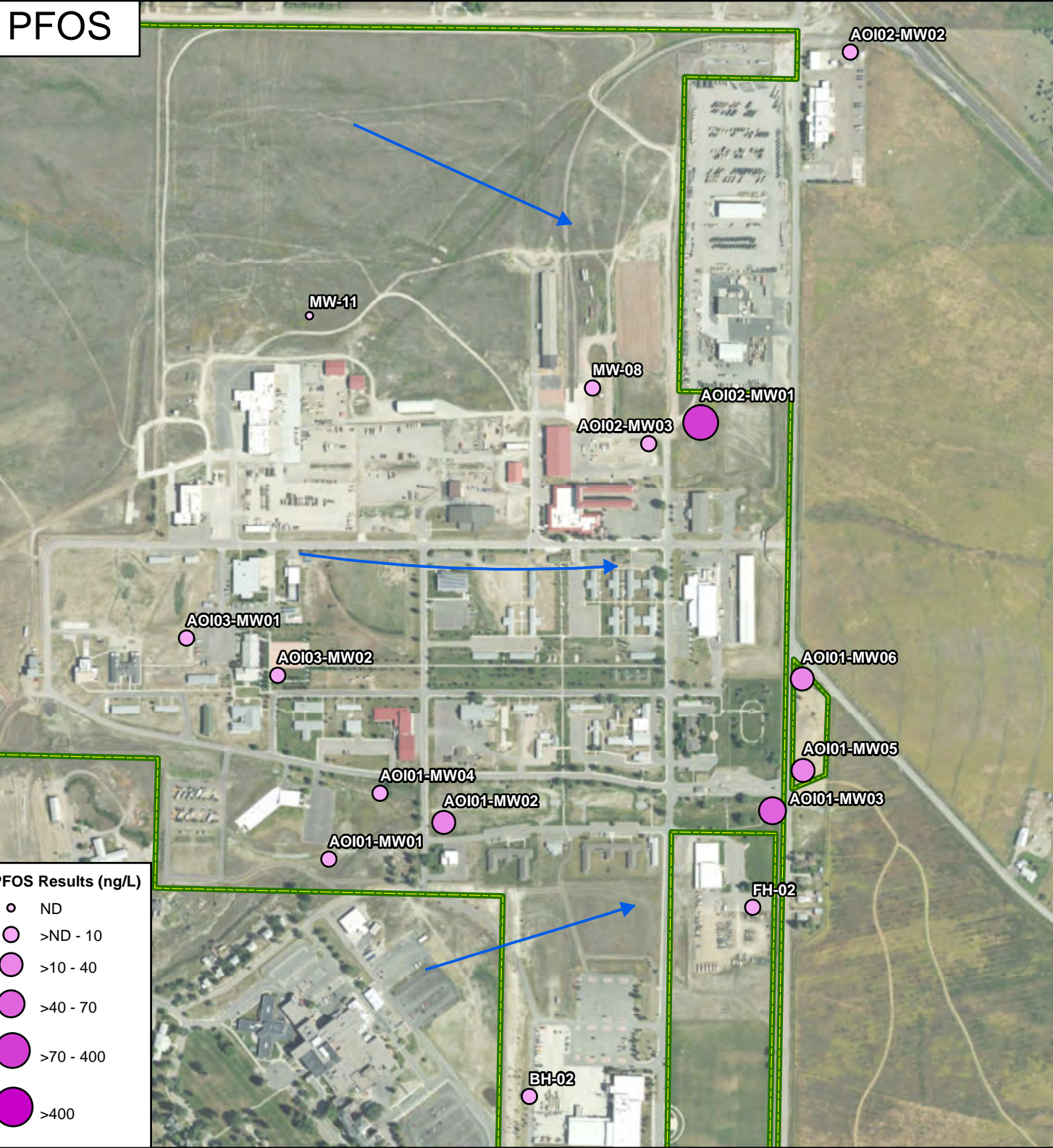
6-25



PFOA

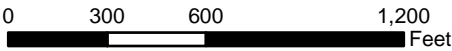


PFOS




CLIENT		ARNG			
PROJECT		Site Inspection for PFAS at Fort William Henry Harrison, MT			
REVISED	6/7/2021	GIS BY	MS	6/7/2021	
SCALE	1:6,992	CHK BY	JH	6/7/2021	
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM	CM	6/7/2021	

- Legend**
- Facility Boundary
  - Groundwater Flow Direction



PFOA and PFOS Detections in Groundwater During SI Mobilization 2 (AOI 1-3) October 9-14, 2020



12420 Milestone Center Drive  
Germantown, MD 20876

Figure 6-6

## 7. Exposure Pathways

The CSMs for each AOI, revised based on the SI findings, are presented on **Figure 7-1** through **Figure 7-3**. A CSM presents the current understanding of the site conditions with respect to known and suspected sources, potential transport mechanisms and migration pathways, and potentially exposed human receptors. A human exposure pathway is considered potentially complete when the following conditions are present:

1. Contaminant source;
2. Environmental fate and transport;
3. Exposure point;
4. Exposure route; and
5. Potentially exposed populations

If any of these elements are missing, the pathway is incomplete. The CSM figures use an empty circle symbol to represent an incomplete exposure pathway. Areas with an incomplete pathway generally warrant no further action; however, the pathway is considered potentially complete if PFOA, PFOS, or PFBS are detected, in which case the CSM figure uses a half-filled circle symbol to represent a potentially complete exposure pathway. Additionally, a completely filled circle symbol is used to indicate when a potentially complete exposure pathway has detections of PFOA, PFOS, or PFBS above the SLs. Areas with an identified potentially complete pathway may warrant further investigation. In general, the potential routes of exposure to PFAS are ingestion and inhalation. Human exposure via the dermal contact pathway may occur, and current risk practice suggests it is an insignificant pathway compared to ingestion; however, exposure data for dermal pathways are sparse and continue to be the subject of PFAS toxicological study. The receptors evaluated are consistent with those listed in USEPA guidance for risk screening (USEPA, 2001). Receptors include site workers (e.g., facility staff and visiting soldiers), construction workers, trespassers, residents outside the facility boundary, and recreational users outside of the facility boundary.

### 7.1 Soil Exposure Pathway

The SI results for PFOA, PFOS, and PFBS in soil were used to determine whether a potentially complete pathway exists between the source and potential receptors at each AOI based on the aforementioned criteria.

#### 7.1.1 AOI 1

From approximately 1995 to 2003, AFFF was released by the MTARNG to soil in AOI 1 through firetruck washing and emptying near the 1049th Engineer Detachment Building (1010 Building) into the Mt. Defensa Avenue Drainage Ditch. In addition, the 1049th also trained with foam in the Navy Parking Lot north of AOI1-MW1 (1049th Firefighting Training Area 1) and in the channel area east of AOI1-MW2 before the channel was excavated (1049th Firefighting Training Area 3). Specific details regarding the frequency, volume, chemical composition, and concentration of any potential AFFF used at either FTA are not known. There is adjacent, offsite potential PFAS releases that have occurred upgradient of FTWHH near this ditch from VA fire department activities. PFOA, PFOS, and PFBS were detected in soil in this AOI 1; however, concentrations were below SLs. Based on the results of the SI in AOI 1, ground-disturbing activities could potentially result in site worker, construction worker, trespasser, resident, and recreational user exposure to PFOA, PFOS, and PFBS via inhalation of dust. Ground-disturbing activities could potentially result in site worker, construction worker, trespasser, and recreational user exposure



to PFOA, PFOS, and PFBS via ingestion of surface soil. Additionally, ground-disturbing activities to subsurface soil could potentially result in construction worker exposure. No current construction is occurring at AOI 1. Additionally, off-facility residents may potentially be exposed to PFOA, PFOS, and PFBS via inhalation of dust caused by on-facility ground disturbing activities, although this exposure is likely insignificant. The CSM for AOI 1 is presented on **Figure 7-1**.

### 7.1.2 AOI 2

AFFF was released to soil at three potential PFAS release areas within the AOI 2. The Former Weasel Barn located in the northeast section of the Cantonment Area, north of Sanananda Drive, was demolished in the winter of 2002 as part of a fire training exercise. Due to flooding of the Mt. Defensa Avenue Drainage Ditch (in AOI 1) during rapid snowmelt and large rainfall events, the central portion of the ditch was widened in 2016 via excavation. Excavated soil was used to create a vehicle staging area in AOI 2, adjacent to the retention pond. AFFF was stored at the MTARNG 1049th Engineer Detachment buildings. Due to the corrosive nature of AFFF to the firetruck storage tanks, AFFF was added just prior to imminent use. The firetrucks were washed near Building M1. In addition, the 1049th trained with foam in the parking lot south of MW-08. Specific details regarding the frequency, volume, chemical composition, and concentration of any potential AFFF used at the FTA are not known. PFAS were detected in soil in this area; however, concentrations were below SLs. Based on the results of the SI in AOI 2, ground-disturbing activities could potentially result in site worker, construction worker, trespasser, resident, and recreational user exposure to PFOA, PFOS, and PFBS via inhalation of dust. Ground-disturbing activities could potentially result in site worker, construction worker, trespasser, and recreational user exposure to PFOA, PFOS, and PFBS via ingestion of surface soil. Additionally, ground-disturbing activities to subsurface soil could potentially result in construction worker exposure. No current construction is occurring at AOI 2. Additionally, off-facility residents may potentially be exposed to PFOA, PFOS, and PFBS via inhalation of dust caused by on-facility ground disturbing activities, although this exposure is likely insignificant. The CSM for AOI 2 is presented on **Figure 7-2**.

### 7.1.3 AOI 3

A structure was burned in the northwest portion of the Cantonment Area near the current Dining Facility (Building 410). The structure was burned sometime between 1995 and 2002. No information was available on the concentration or amount of AFFF used during the event. In addition, the 1049th trained with foam near the former location of Building 410 (Planned Fire Structure). Specific details regarding the frequency, volume, chemical composition, and concentration of any potential AFFF used at the FTA are not known. During the SI, PFAS were detected in soil in this area; however, concentrations were below SLs. Based on the results of the SI in AOI 3, ground-disturbing activities could potentially result in site worker, construction worker, trespasser, resident, and recreational user exposure to PFOA, PFOS, and PFBS via inhalation of dust. Ground-disturbing activities could potentially result in site worker, construction worker, trespasser, and recreational user exposure to PFOA, PFOS, and PFBS via ingestion of surface soil. Additionally, ground-disturbing activities to subsurface soil could potentially result in construction worker exposure. No current construction is occurring at AOI 3. The CSM for AOI 3 is presented on **Figure 7-3**.

## 7.2 Groundwater Exposure Pathway

The SI results for PFOA, PFOS, and PFBS in groundwater were used to determine whether a potentially complete pathway exists between the source and potential receptors at each AOI based on the aforementioned criteria.



### 7.2.1 AOI 1

PFOA, PFOS, and PFBS were detected in groundwater from permanent monitoring wells at AOI 1 and exceeded the SL for PFOS at AOI1-MW3, which is located near the facility boundary. Private residential drinking water well sampling downgradient of AOI 1 was performed in 2019, and PFOA, PFOS, and PFBS were detected in groundwater, but were below SLs. Therefore, the ingestion exposure pathway for groundwater is considered potentially complete for offsite residents. The facility is on city water, which has been tested and confirmed to be PFAS-free (see **Section 2.2.2**); therefore, the ingestion pathway is incomplete for site workers. Further, due to the depth of groundwater, the ingestion pathway for construction workers, off-facility recreational users, and trespassers is also considered incomplete. The CSM for AOI 1 is presented on **Figure 7-1**.

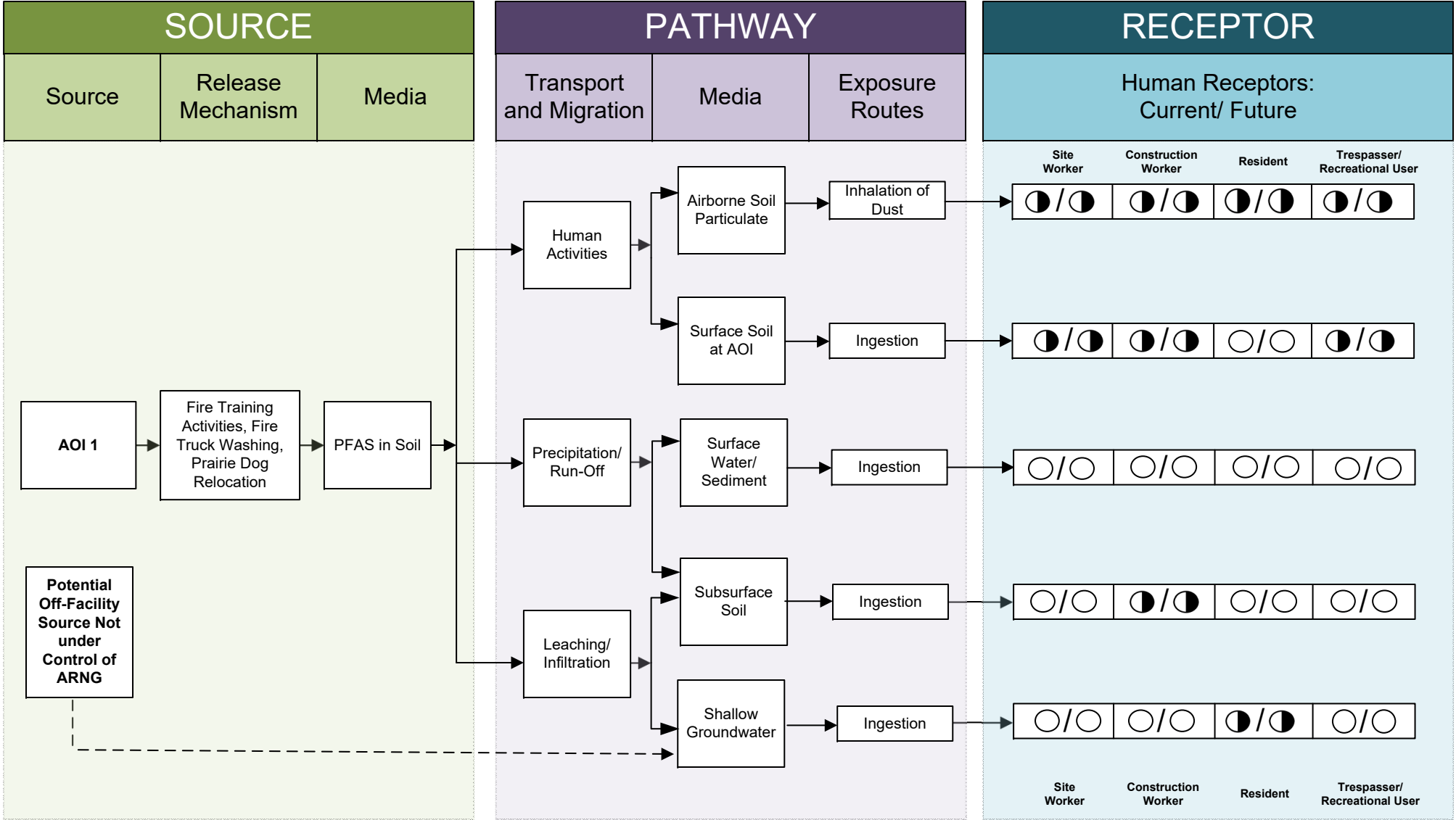
### 7.2.2 AOI 2

PFOA, PFOS, and PFBS were detected in groundwater from permanent monitoring wells at AOI 2 and exceeded the SL for PFOS at AOI2-MW1, which is located near the facility boundary. Private residential drinking water well sampling downgradient of AOI 1 was performed in 2019, and PFOA, PFOS, and PFBS were detected in groundwater, but were below SLs. Therefore, the ingestion exposure pathway for groundwater is considered potentially complete for offsite residents. The facility is on city water, which has been tested and confirmed to be PFAS-free (see **Section 2.2.2**); therefore, the ingestion pathway is incomplete for site workers. Further, due to the depth of groundwater, the ingestion pathway for construction workers, off-facility recreational users, and trespassers is also considered incomplete. The CSM for AOI 2 is presented on **Figure 7-2**.

### 7.2.3 AOI 3

PFOA, PFOS, and/ or PFBS were detected in groundwater, but did not exceed SLs at AOI 3. PFOA, PFOS, and PFBS were detected in groundwater from permanent monitoring wells at AOI 3 at concentrations below the SLs. Therefore, the ingestion exposure pathway for groundwater is considered potentially complete for offsite residents. The facility is on city water, which has been tested and confirmed to be PFAS-free (see **Section 2.2.2**); therefore, the ingestion pathway is incomplete for site workers. Further, due to the depth of groundwater, the ingestion pathway for construction workers, off-facility recreational users, and trespassers is also considered incomplete. The CSM for AOI 3 is presented on **Figure 7-3**.

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**LEGEND**

- □ Flow-Chart Stops
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- - - → Partial / Possible Flow
- Incomplete Pathway
- ◐ Potentially Complete Pathway
- Complete Pathway

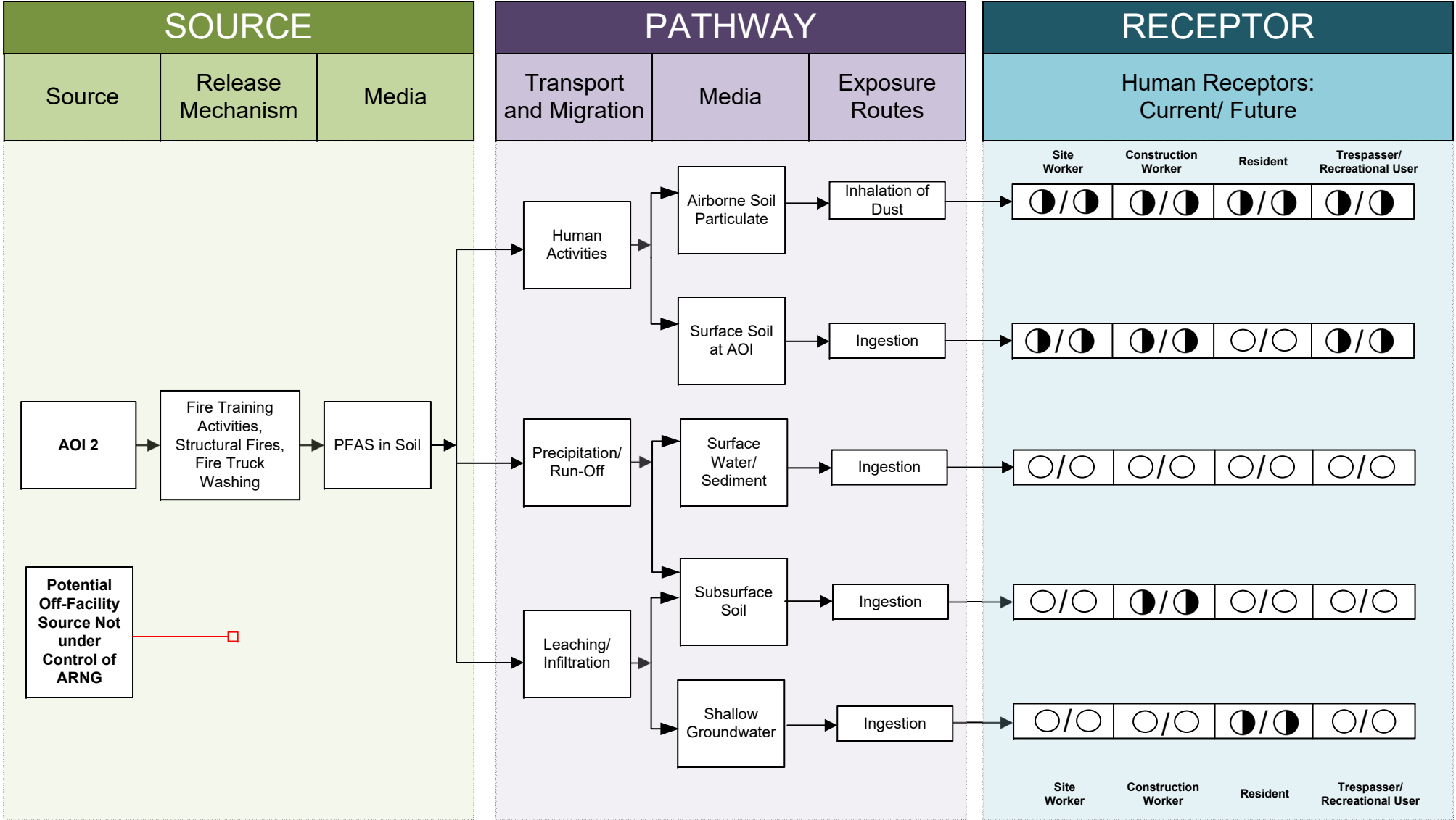
**Notes:**

1. The resident and recreational user receptors refer to an off-site resident and recreational user.
2. Dermal contact exposure pathway is incomplete for PFAS.

**Figure 7-1**  
 Conceptual Site Model  
 AOI 1 Mt. Defensa Avenue Drainage Ditch

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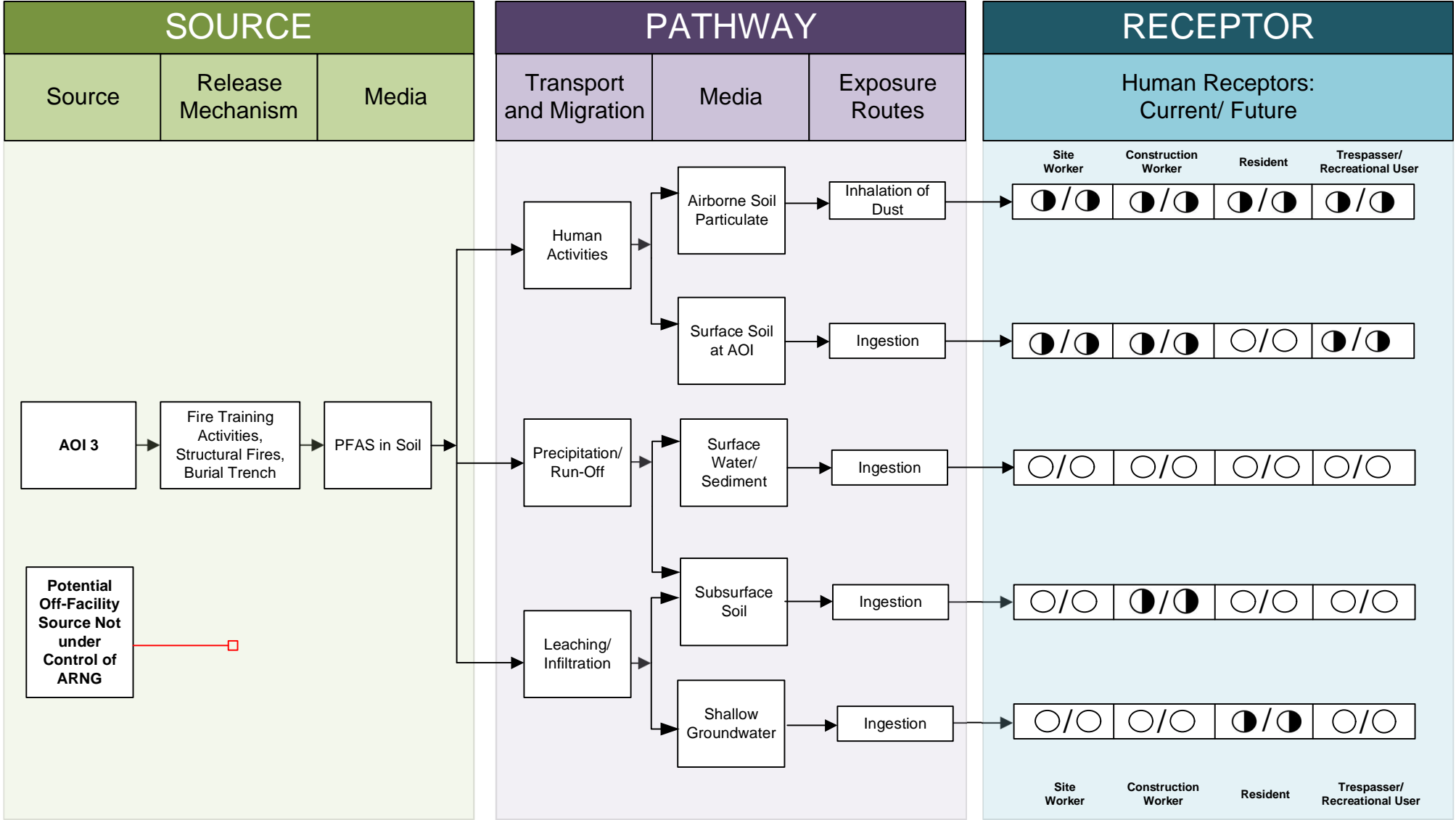
**LEGEND**

- □ Flow-Chart Stops
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- - - -> Partial / Possible Flow
- Incomplete Pathway
- ◐ Potentially Complete Pathway
- Complete Pathway

**Notes:**  
 1. The resident and recreational user receptors refer to an off-site resident and recreational user.  
 2. Dermal contact exposure pathway is incomplete for PFAS.

**Figure 7-2**  
 Conceptual Site Model  
 AOI 2 Cantonment Area Northeast

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- □ Flow-Chart Stops
- > Flow-Chart Continues
- - -> Partial / Possible Flow
- Incomplete Pathway
- ◐ Potentially Complete Pathway
- Complete Pathway

**Notes:**

1. The resident and recreational user receptors refer to an off-site resident and recreational user.
2. Dermal contact exposure pathway is incomplete for PFAS.

**Figure 7-3**  
Conceptual Site Model  
AOI 3 Cantonment Area Northwest

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## 8. Summary and Outcome

This section summarizes SI activities and findings. The most significant findings are summarized in this section and are reproduced directly or abstracted from information contained in the report. The outcome provides general and comparative interpretations of the findings relative to the SLs.

### 8.1 SI Activities

SI field activities were conducted in two mobilizations. The first mobilization included permanent groundwater monitoring well installation, development, and sampling; surface and subsurface soil sampling; and groundwater sampling from existing wells from 10 to 20 February 2019 and from 19 to 31 May 2019. The second mobilization included permanent groundwater monitoring well installation, development, and sampling; surface and subsurface soil sampling; and groundwater sampling from existing wells from 5 to 15 October 2020. Field activities were conducted in accordance with the SI QAPP Addendum (AECOM, 2019).

To fulfill the project DQOs set forth in the approved SI QAPP Addendum (AECOM, 2019), samples were collected and analyzed for a subset of PFAS via LC/MS/MS compliant with DoD QSM 5.1 Table B-15 as follows. The 18 PFAS analyzed as part of the ARNG SI program are specified in **Section 5.8** of this Report.

#### Mobilization 1 –

- 47 soil grab samples from 27 boring locations; and
- 15 groundwater samples, six from new monitoring well locations, eight from existing monitoring well locations, and one from an irrigation well location.

#### Mobilization 2 –

- 30 soil grab samples from 27 boring locations; and
- 15 groundwater samples, five from new monitoring well locations and ten from existing monitoring well locations.

This information gathered during this investigation was used to determine the PFOA, PFOS, and PFBS at or above SLs, as well as the presence or absence of an additional 15 PFAS at the facility. Additionally, the CSMs were refined to assess whether a complete pathway exists between the source and receptors for potential exposure to PFOA, PFOS, and PFBS at the AOIs, which are described in **Section 7**.

### 8.2 SI Goals Evaluation

As described in **Section 4.2**, the SI activities were designed to achieve six main goals or DQOs. This section describes the SI goals and the conclusions that can be made for each based on the data collected during this investigation.

- 1) *Determine the presence or absence of PFOA, PFOS, and PFBS at or above SLs, as well as the presence or absence of an additional 15 PFAS at the Site*

PFOA, PFOS, and PFBS were detected at FTWHH in both soil and groundwater. PFOA, PFOS, and PFBS were detected both at the source areas as well as at the facility boundary between source areas and potential drinking water receptors. PFOS in groundwater at AOI 1 and AOI 2 exceeded the SL of 40 ng/L. Detections of PFOA and PFBS in groundwater were below the SLs. Additionally, the detected concentrations of PFOA, PFOS, and PFBS in soil samples from all AOIs were below the SLs.

- 2) *Develop information to potentially eliminate a release from further consideration because it is determined that it poses no significant threat to human health or the environment.*

Five potential PFAS release areas were removed from further consideration based on the data collected during this SI: Prairie Dog Relocation (AOI 1), 1049th Engineer Detachment Building M1 (AOI 2), Burial Trench (AOI 2), Planned Structure Fire (AOI 3), and 1049th Firefighting Training Area 2 (AOI 3). PFOA, PFOS, and PFBS results were below the SLs in soil and groundwater; therefore, these areas pose no significant threat to human health or the environment.

- 3) *Determine the potential need for a removal action.*

As described in **Section 2.4**, in 2019, offsite residential drinking water samples were collected due to the exceedance of SLs observed in groundwater during the FTWHH SI. Five properties were selected to be sampled due to their proximity to FTWHH. PFOA, PFOS, and/or PFBS were detected in all five of the drinking water samples collected but were below SLs. Additionally, groundwater samples collected adjacent to the main gate at the MacDonald Property during Mobilization 2 were also below SLs. A removal action is not needed at this time because the drinking water sample results were below the SLs.

- 4) *Collect data to better characterize the release areas for more effective and rapid initiation of a RI.*

The geological data collected as part of the SI is consistent with the descriptions of the Quaternary aged alluvium for the area. The alluvium is described as a gray to brown, moderately sorted, pebble to cobble gravel with fine- to coarse-grained sand matrix. Boring logs from AOI 1, AOI 2, and AOI 3 are presented in **Appendix E**. Well borings in AOI 1 along the southern facility boundary are aligned from west to east and likely parallel the depositional direction. Most of the samples were similar in that they contained varying percentages of gravel ranging from 5 to 50% in a sand matrix. The sand matrix size and size range also varied from fine to coarse.

Typically, the gravels observed from ground surface to 5 feet bgs ranged from 0.5 inches to 1 inch in diameter and from 5 to 20 feet bgs the diameter increased to from 0.5 to 4 inches. Between 20 and 30 feet bgs the gravel ranged from 3.5 to >5 inches in diameter and generally the shape of the gravels became more rounded towards the east. At a depth of 50 feet bgs, a white silt/clay layer was encountered in the boring for AOI-MW1. The origin of this distinctive white layer is unknown, but it could possibly be the interface between the younger alluvium (weathered volcanic ash) and the older lakebed sediments. The same white layer was also observed in the boring for AOI3-MW1, and AOI03-MW02. The borings in AOI 2 were generally shallower than in the other two areas because the water table was encountered at a shallower depth at AOI 2. However, a similar pattern of better rounding of gravels in the eastern most boring for AOI 2 was observed.

Depth to water at the facility ranges from approximately 14 to 43 feet bgs. The horizontal gradient in the northern portion of the facility between OBTMW-01 and AOI2-MW1 is 0.013 feet per foot. The horizontal gradient in the southern portion of the facility between AOI1-MW1 and AOI1-MW3 is 0.020 feet per foot.

- 5) *Identify within 4 miles of the installation other potential PFAS sources (fire stations, major manufacturers, other DoD facilities) and receptors, including both groundwater and surface water receptors, to determine whether the ARNG is the likely source of PFAS, or whether there is an offsite source of PFAS responsible for installation detections of PFAS (USEPA, 2005).*

Based upon the evaluation of groundwater and soil results in comparison to SLs, in combination with the groundwater flow direction analysis, the source of PFAS contamination is likely attributable to ARNG activities.

6) *Determine whether a complete pathway exists between the source and potential receptors and whether ARNG is the likely source of the contamination.*

PFOA, PFOS, and PFBS were detected in soil and groundwater at source areas and the facility boundary indicate a potentially complete pathway between source and receptor. However, as described in **Section 2.4**, offsite residential drinking water samples were collected due to the exceedance of SLs observed in groundwater during the FTWHH SI. Five properties were selected to be sampled due to their proximity to FTWHH. PFOA, PFOS, and PFBS were detected in all five of the drinking water samples collected but were below SLs. Additional offsite residential drinking water sampling is recommended due to the SL groundwater exceedance of PFOS at AOI 1 and AOI 2.

### 8.3 Outcome

The CSMs were revised based on the SI findings. There is potential for exposure to offsite residential drinking water receptors from historical firefighting training activities completed with AFFF at FTWHH. Offsite drinking water sampling was performed at several residences downgradient of AOI 1 and east of the FTWHH property boundary. PFOA, PFOS, and/or PFBS were detected in the drinking water samples but the concentrations did not exceed SLs. Drinking water samples were not collected downgradient of AOI 2. Due to historical firefighting training activities completed with AFFF, there is a potential for exposure to offsite residential drinking water receptors east of the FTWHH property boundary.




























Sample chemical analytical concentrations collected during the SI were compared against the project SLs for PFOA, PFOS, and PFBS in soil and groundwater, as described in **Table 6-1**. The following bullets summarize the SI results:

- PFOA, PFOS, and PFBS were detected in soil at AOI 1, AOI 2, and AOI 3; however, results did not exceed SLs.
- PFOA, PFOS, and PFBS were detected in groundwater at AOI 1, AOI 2, and AOI 3. PFOS exceeded SLs at AOI 1 and AOI 2; however, no other results exceeded SLs at AOI 3.

**Table 8-1** summarizes the SI results for soil and groundwater. Based on the CSMs developed and revised in light of the SI findings, there is potential for exposure to residential drinking water receptors caused by DoD activities at or adjacent to the facility.

**Table 8-2** summarizes the rationale used to determine if an AOI should be considered for further investigation under CERCLA and undergo an RI. Based on the results of this SI, further evaluation is warranted in the RI for AOI 1 and AOI 2.

**Table 8-1: Summary of Site Inspection Findings**


AOI	Potential PFAS Release Area	Soil – Source Area	Groundwater – Source Area	Groundwater – Facility Boundary
1	Mt. Defensa Avenue Drainage Ditch			
1	1049th Engineer Detachment Building 1010			NA
1	Prairie Dog Relocation (three locations)		NA	NA
1	1049th Firefighting Training Area 1			NA
1	1049th Firefighting Training Area 3		NA	NA
1	MacDonald Property			NA
2	Former Weasel Barn			
2	Excavated Soil from Mt. Defensa Ave Drainage Ditch			
2	1049th Engineer Detachment Building M1			
2	1049th Firefighting Training Area 4			NA
3	Planned Structure Fire			NA
3	Burial Trench	NA		NA
3	1049th Firefighting Training Area 2			NA

**Legend:**

NA = Not applicable

 = detected; exceedance of the screening levels

 = detected; no exceedance of the screening levels

 = not detected



**Table 8-2: Site Inspection Recommendations**

AOI	Description	Rationale	Future Action
1	Mt. Defensa Avenue Drainage Ditch, 1049th Engineer Detachment Building 1010, 1049th Firefighting Training Area 1, 1049th Firefighting Training Area 3	No exceedances of SL in groundwater at the source area; however, exceedances of SLs in groundwater at the facility boundary. No exceedances of SLs in soil.	Proceed to RI
1	Prairie Dog Relocation (Three Release Areas)	No exceedances of SLs in soil.	No further action
2	Former Weasel Barn, Excavated Soil from Mt. Defensa Ave Drainage Ditch, 1049th Firefighting Training Area 4	No exceedances of SL in groundwater at the source area; however, exceedances of SLs in groundwater at the facility boundary. No exceedances of SLs in soil.	Proceed to RI
2	1049th Engineer Detachment Building M1	No exceedances of SLs in groundwater or soil.	No further action
3	Planned Structure Fire, Burial Trench, and 1049th Firefighting Training Area 2	No exceedances of SLs in groundwater or soil.	No further action

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## 9. References

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## **Appendix A**

### **Data Validation Reports**

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Due to file size, Appendix will be provided electronically (CD) in the final report or can be requested.

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## **Appendix B**

### **Field Documentation**

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## **Appendix B1**

### **Logs of Daily Notice of Field Activities**



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**Log of Daily Notice of Field Activity**  
**FTWHH Site Inspection, Phase 1, Fort William Henry Harrison, MT**

Date	AECOM Personnel	Weather	Summary Daily Activities	Issues	Progress to Date	Subcontractor(s)/ Visitors
5/31/2019	Bryce Pewonka	49-69°F, overcast	<ul style="list-style-type: none"> <li>- AECOM held tailgate meeting. Reviewed demobilization activities.</li> <li>- Policed warehouse area and shipped remaining equipment back to rental agencies.</li> <li>- Returned keys to MTARNG.</li> <li>- Demobilized</li> </ul>	None	Wells Installed: 6/6 Wells Developed: 6/6 Wells Sampled: 15/16 Soil Samples Collected: 29/29	None
5/30/2019	Chris Beza (SSHO), Luke Councill, and Bryce Pewonka	52-77°F, sunny with rain late in the day	<ul style="list-style-type: none"> <li>- AECOM held tailgate meeting. Reviewed scope of work, H&amp;S as well as daily PFAS sampling checklist.</li> <li>- Collected groundwater samples at OBTMW-01, MW-11, MW-07, AOI2-MW2, and Pump House. Duplicate/MS/MSD collected at the Pump House location.</li> <li>- The USGS well was just a PVC stickup location to measure water level, and not a properly installed well location; therefore, the location was not sampled.</li> <li>- Policed the sampling areas/new well locations areas, and began demobilization activities.</li> <li>- Packaged and shipped samples.</li> <li>- Inventoried remaining supplies and IDW drums.</li> </ul>	None	Wells Installed: 6/6 Wells Developed: 6/6 Wells Sampled: 15/16 Soil Samples Collected: 29/29	None
5/29/2019	Chris Beza (SSHO), Luke Councill, and Bryce Pewonka	46-74°F, sunny	<ul style="list-style-type: none"> <li>- AECOM held tailgate meeting. Reviewed scope of work, H&amp;S as well as daily PFAS sampling checklist.</li> <li>- Collected groundwater samples at AOI1-MW2, AOI3-MW1, MW-6, MW-8, AOI2-MW1, and MW-10.</li> <li>- Collected and shipped the split samples for Battelle at MW-6 and MW-8.</li> </ul>	None	Wells Installed: 6/6 Wells Developed: 6/6 Wells Sampled: 10/16 Soil Samples Collected: 29/29	None
5/28/2019	Chris Beza (SSHO), Luke Councill, and Bryce Pewonka	40-70°F, sunny	<ul style="list-style-type: none"> <li>- AECOM held tailgate meeting. Reviewed scope of work, H&amp;S as well as daily PFAS sampling checklist.</li> <li>- Developed AOI2-MW2, 110 gallons purged, turbidity 18 NTUs.</li> <li>- Collected groundwater samples at FH-02, AOI1-MW1, and BH-02.</li> </ul>	None	Wells Installed: 6/6 Wells Developed: 6/6 Wells Sampled: 4/16 Soil Samples Collected: 29/29	None

**Log of Daily Notice of Field Activity**  
**FTWHH Site Inspection, Phase 1, Fort William Henry Harrison, MT**

Date	AECOM Personnel	Weather	Summary Daily Activities	Issues	Progress to Date	Subcontractor(s)/ Visitors
5/25/2019	Chris Beza (SSHO) and Luke Councell	48-60°F, overcast/rainy	<ul style="list-style-type: none"> <li>- AECOM held tailgate meeting. Reviewed scope of work, H&amp;S as well as daily PFAS sampling checklist.</li> <li>- Developed AOI3-MW1, 25 gallons purged, turbidity 100 NTUs.</li> <li>- Collected groundwater sample at AOI1-MW3.</li> </ul>	None	Wells Installed: 6/6 Wells Developed: 5/6 Wells Sampled: 1/16 Soil Samples Collected: 29/29	None
5/24/2019	Chris Beza (SSHO) and Luke Councell	42-61°F, partly cloudy	<ul style="list-style-type: none"> <li>- AECOM held tailgate meeting. Reviewed scope of work, H&amp;S as well as daily PFAS sampling checklist.</li> <li>- Developed AOI2-MW1, 110 gallons purged, turbidity 75 NTUs.</li> <li>- Completed the well surface completions at the newly installed wells.</li> <li>- Moved IDW drums to staging area and re-inventoried, 30 drums.</li> <li>- Cascade demobilized from the site.</li> </ul>	None	Wells Installed: 6/6 Wells Developed: 4/6 Wells Sampled: 0/16 Soil Samples Collected: 29/29	Cascade (Austin Morgan and Aaron Bradley)  Montana State Interns, Hunter Henschel and Rania Belcourt)
5/23/2019	Chris Beza (SSHO) and Luke Councell	41-61°F, partly cloudy	<ul style="list-style-type: none"> <li>- AECOM held tailgate meeting. Reviewed scope of work, H&amp;S as well as daily PFAS sampling checklist.</li> <li>- Developed AOI1-MW2, 15 gallons purged, turbidity 150 NTUs, recharge very slow.</li> <li>- Soil boring samples were collected from AOI2-SB2 at the surface, midpoint, and above the water table. Sample IDs were AOI2-SB2-0-2, AOI2-SB2-8-10, and AOI2-SB2-18-20. Duplicate sample collected at AOI2-SB2-0-2.</li> <li>- Monitoring well AOI2-MW2 was installed and screened at 20-30' bgs, grouted, and finished with a 2.0 foot stick-up completion. The well pad and bollards will be installed on Friday.</li> <li>-All samples shipped to the laboratory.</li> </ul>	None	Wells Installed: 6/6 Wells Developed: 3/6 Wells Sampled: 0/16 Soil Samples Collected: 29/29	Cascade (Austin Morgan and Aaron Bradley)  Montana State Interns, Hunter Henschel and Renia Belcourt)

**Log of Daily Notice of Field Activity**  
**FTWHH Site Inspection, Phase 1, Fort William Henry Harrison, MT**

Date	AECOM Personnel	Weather	Summary Daily Activities	Issues	Progress to Date	Subcontractor(s)/ Visitors
5/22/2019	Chris Beza (SSHO) and Luke Councell	45-58°F, cloudy	<ul style="list-style-type: none"> <li>- AECOM held tailgate meeting. Reviewed scope of work, H&amp;S as well as daily PFAS sampling checklist.</li> <li>- Developed AOI1-MW3, 165 gallons purged, turbidity 4.5 NTUs.</li> <li>- Developed AOI1-MW1, 110 gallons purged, 31 NTUs.</li> <li>- Soil boring samples were collected from AOI3-SB1 at the surface, midpoint, and above the water table. Sample IDs were AOI3-SB1-0-2, AOI3-SB1-18-20, and AOI3-SB1-40-42.</li> <li>- Monitoring well AOI3-MW1 was installed and screened at 48-58' bgs, grouted, and finished with a 2.0 foot stick-up completion. The well pad and bollards will be installed on Friday.</li> <li>-Moved the rig to AOI2-SB2.</li> </ul>	None	Wells Installed: 5/6 Wells Developed: 2/6 Wells Sampled: 0/16 Soil Samples Collected: 29/29	Cascade (Austin Morgan and Aaron Bradley)  Montana State Interns, Hunter Henschel and Renia Belcourt)
5/21/2019	Chris Beza (SSHO) and Luke Councell	45-49°F, overcast, rain late in the day	<ul style="list-style-type: none"> <li>- AECOM held tailgate meeting. Reviewed scope of work, H&amp;S as well as daily PFAS sampling checklist.</li> <li>- Collected water levels measurements on existing groundwater monitoring wells.</li> <li>- Prepared wells installed in February 2019 for development.</li> <li>- Soil boring samples were collected from AOI2-SB1 at the surface, midpoint, and above the water table. Sample IDs were AOI2-SB1-0-2, AO21-SB1-9-11, and AOI2-SB1-18-20. An equipment blank was collected at this well location.</li> <li>- Monitoring well AOI2-MW1 was installed and screened at 28-38' bgs, grouted, and finished with a 2.0 foot stick-up completion. The well pad and bollards will be installed on Friday.</li> <li>-Moved the rig to AOI3-SB1 and began drilling activities.</li> </ul>	None	Wells Installed: 4/6 Wells Developed: 0/6 Wells Sampled: 0/16 Soil Samples Collected: 29/29	Cascade (Austin Morgan and Aaron Bradley)

**Log of Daily Notice of Field Activity**  
**FTWHH Site Inspection, Phase 1, Fort William Henry Harrison, MT**

Date	AECOM Personnel	Weather	Summary Daily Activities	Issues	Progress to Date	Subcontractor(s)/ Visitors
5/20/2019	Chris Beza (SSHO) and Luke Councell	45-50°F, overcast	<ul style="list-style-type: none"> <li>- AECOM held tailgate meeting. Reviewed scope of work, H&amp;S as well as daily PFAS sampling checklist.</li> <li>- Re-inventoried the equipment/supplies at the warehouse space on FTWHH.</li> <li>- Montana 811 completed the relocate and re-cleared utilities at the remaining three monitoring well locations, prior to arriving at the facility.</li> <li>- Collected 5 soil samples at AOI 2 using hand auguring techniques. Sample IDs were AOI12-SS1-0-2, AOI12-SS2-0-2, AOI12-SS3-0-2, AOI12-SS4-0-2, and AOI12-SS5-0-2. A duplicate was collected at AOI2-SS2. A matrix spike/matrix spike duplicated was collected at AOI2-SS4. A field rinsate blank was collected at AOI2-SS5.</li> <li>- During the February 2019 sampling event, the sample location for AOI-SS1 was relocated due to snow volume; however, after snow melt MTARNG indicated that the revised location was very close to the road and we may have collected only fill. Therefore, a surface soil sample was recollected at AOI-SS01-0-2R.</li> <li>- Drillers arrived at 1400 and readied the drilling</li> </ul>	None	Wells Installed: 3/6 Wells Developed: 0/6 Wells Sampled: 0/16 Soil Samples Collected: 29/29	Montana State Interns, Hunter Henschel and Renia Belcourt)  Cascade (Austin Morgan and Aaron Bradley)
5/19/2019	Chris Beza (SSHO) and Luke Councell	47°F, sunny	<ul style="list-style-type: none"> <li>- All team members mobilized to Helena, Montana.</li> </ul>	None	Wells Installed: 0/6 Wells Developed: 0/6 Wells Sampled: 0/16 Soil Samples Collected: 24/29	None



**Log of Daily Notice of Field Activity**  
**FTWHH Site Inspection, Phase 1, Fort William Henry Harrison, MT**

Date	AECOM Personnel	Weather	Summary Daily Activities	Issues	Progress to Date	Subcontractor(s)/ Visitors
2/20/2019	Jennifer Zorinsky, Chris Beza (SSHO), and Luke Councell	10-20°F, sunny, cold	<ul style="list-style-type: none"> <li>- AECOM held tailgate meeting. Reviewed scope of work, H&amp;S as well as daily PFAS sampling checklist.</li> <li>- Soil boring samples were collected from AOI1-MW3 at the surface, midpoint, and above the water table. Sample IDs were AOI1-SB3-0-2, AOI1-SB3-18-20 , and AOI1-SB3-38-40. A duplicate was collected at AOI1-SB3-18-20.</li> <li>- AOI1-MW3 static water level measured at approximately 43' bgs. Well was screened at 40-50' bgs, grouted, and finished with a flush-mount completion.</li> <li>-Collected 1 soil sample at AOI1-SS6 using rotonsonic techniques.</li> <li>-Discarded groundwater samples collected from MW8, MW10, MW11, and OBTMW-01 and the associated field blank with the purge water IDW.</li> <li>-Collected GPS coordinates on all remaining sample locations and removed pin flags.</li> <li>-Packed and shipped all equipment and samples.</li> <li>-Moved all drums to the designated staging area. All drums were placed on pallets and are not blocking MTARNG equipment.</li> <li>-Picked up decon pad and cleaned work areas.</li> </ul>	None	Wells Installed: 3/6 Wells Developed: 0/6 Wells Sampled: 0/16 Soil Samples Collected: 24/29	Cascade (Brandon Pizzuti, Aaron Bradley, Frank Scott)
2/19/2019	Jennifer Zorinsky, Chris Beza (SSHO), and Luke Councell	-15-15°F, winter weather advisory, very cold	- AECOM held internal discussions regarding temperature duress to personnel and equipment. Fieldwork for the day was cancelled due to safety concerns.	-For safety reasons, AECOM will demobilize from the field as soon as drilling and well installation at AOI1-MW3 is completed.	Wells Installed: 2/6 Wells Developed: 0/6 Wells Sampled: 4/16 Soil Samples Collected: 23/29	None

**Log of Daily Notice of Field Activity**  
**FTWHH Site Inspection, Phase 1, Fort William Henry Harrison, MT**

Date	AECOM Personnel	Weather	Summary Daily Activities	Issues	Progress to Date	Subcontractor(s)/ Visitors
2/18/2019	Jennifer Zorinsky, Chris Beza (SSHO), and Luke Councell	-10-0°F, winter weather advisory, very cold	- AECOM held tailgate meeting. Reviewed scope of work, H&S as well as daily PFAS sampling checklist. -Sampled existing groundwater wells MW10, MW-10-19A; MW11, MW-11-19A; and OBTMW-01, OBTMW-01-19A.	-Groundwater was freezing in tubing upon exiting the well casing. The pump cycle was shortened and the tubing from the well casing to the YSI was placed in a bucket of warm water to prevent freezing. -Rotosonic drill rig would not start. Drillers suspected the batteries were dead due to the very cold temperatures and attempted to charge the batteries using their truck battery. After 4 hours without success starting the rig, the drillers purchased new batteries; however, the rig would still not fully turn over. Drillers purchased a torpedo heater and heated the engine for approximately 2.5 hours. Rotosonic drill rig started at 17:30. Total downtime was approximately 10 hours.	Wells Installed: 2/6 Wells Developed: 0/6 Wells Sampled: 4/16 Soil Samples Collected: 23/29	Cascade (Brandon Pizzuti, Aaron Bradley, Frank Scott)

**Log of Daily Notice of Field Activity**  
**FTWHH Site Inspection, Phase 1, Fort William Henry Harrison, MT**

Date	AECOM Personnel	Weather	Summary Daily Activities	Issues	Progress to Date	Subcontractor(s)/ Visitors
2/16/2019	Jennifer Zorinsky, Chris Beza (SSHO), and Luke Councell	-5-25°F, temperatures dropping throughout the day, cold	<ul style="list-style-type: none"> <li>- AECOM held tailgate meeting. Reviewed scope of work, H&amp;S as well as daily PFAS sampling checklist.</li> <li>- Collected an equipment blank on deconned core barrel (AOI1-MW3-EB).</li> <li>- Finished well completions at AOI1-MW1 and AOI1-MW2 by installing protective casings and bollards.</li> <li>- Sampled existing groundwater well MW08, MW8-19A.</li> <li>- Began well boring at AOI1-MW3; cored to 40'.</li> <li>- Collected a field blank, FIELDBLANK-021619.</li> </ul>	<ul style="list-style-type: none"> <li>- Groundwater was freezing in tubing upon exiting the well casing. The pump cycle was shortened and the tubing from the well casing to the YSI was placed in a bucket of warm water to prevent freezing.</li> <li>- Controller for groundwater sampling will not discharge; suspect the air valve is retaining moisture and is frozen. Equipment will be reevaluated on Monday, and backup equipment will be ordered.</li> <li>- Bolts on the roto sonic drilling head broke and had to be replaced. Total downtime was approximately 1 hour.</li> </ul>	Wells Installed: 2/6 Wells Developed: 0/6 Wells Sampled: 1/16 Soil Samples Collected: 23/29	Cascade (Brandon Pizzuti, Aaron Bradley, Frank Scott)
2/15/2019	Jennifer Zorinsky, Chris Beza (SSHO), and Luke Councell	15-25°F, morning snow, sunny afternoon, cold	<ul style="list-style-type: none"> <li>- AECOM held tailgate meeting. Reviewed scope of work, H&amp;S as well as daily PFAS sampling checklist.</li> <li>- Soil boring samples were collected from AOI1-MW2 at the surface, midpoint, and above the water table. Sample IDs were AOI1-SB2-0-2, AOI1-SB2-15-17, and AOI1-SB2-28-30.</li> <li>- AOI1-MW2 static water level measured at 33.45' bgs. Well was screened at 30-40' bgs and grouted.</li> <li>- Deconned drilling equipment and setup at AOI1-MW3.</li> </ul>	None	Wells Installed: 2/6 Wells Developed: 0/6 Wells Sampled: 0/16 Soil Samples Collected: 23/29	Cascade (Brandon Pizzuti, Aaron Bradley, Frank Scott);  Montana DEQ (Scott Gestring and Pat Skibicki) on-site from 11:30-12:30.

**Log of Daily Notice of Field Activity**  
**FTWHH Site Inspection, Phase 1, Fort William Henry Harrison, MT**

Date	AECOM Personnel	Weather	Summary Daily Activities	Issues	Progress to Date	Subcontractor(s)/ Visitors
2/14/2019	Jennifer Zorinsky, Chris Beza (SSHO), and Luke Councell	10-30°F, mostly cloudy, cold	<ul style="list-style-type: none"> <li>- AECOM held tailgate meeting. Reviewed scope of work, H&amp;S as well as daily PFAS sampling checklist.</li> <li>- Collected 4 soil samples using air knife techniques at 4 locations. One sample was collected from 0-2' at AOI1-SS1, AOI1-SS2, AOI1-SS4, and AOI1-SS5.</li> <li>-An equipment blank was collected on the jackhammer bit at AOI1-SS1.</li> <li>-Collected 1 soil sample with MS/MSD at AOI1-SS3 using roto sonic techniques.</li> <li>- AOI1-MW1 static water level measured at 40.45' bgs. Well was screened at 45-55' bgs and grouted.</li> <li>- Began well boring at AOI1-MW2; cored to 20'.</li> </ul>	<ul style="list-style-type: none"> <li>- The ground is frozen from 1-2' bgs making air knifing and sampling difficult.</li> <li>-Air knifing and hand augering was not possible from 0-2' due to frozen ground. Surface soil locations were jackhammered from 0-2'. Well installation was drilled without hand augering.</li> <li>-AOI1-SS1 (surface soil upgradient of the VA) was moved to the west with permission from MTARNG for accessibility.</li> <li>-6 additional surface soil locations are not accessible using the air knife rig. These locations will be sampled using roto sonic techniques.</li> </ul>	<p>Wells Installed: 1/6  Wells Developed: 0/6  Wells Sampled: 0/16  Soil Samples Collected: 23/29</p>	Cascade (Brandon Pizzuti, David Donnelly, Aaron Bradley, Frank Scott, Caleb Trusty)

**Log of Daily Notice of Field Activity**  
**FTWHH Site Inspection, Phase 1, Fort William Henry Harrison, MT**

Date	AECOM Personnel	Weather	Summary Daily Activities	Issues	Progress to Date	Subcontractor(s)/ Visitors
2/13/2019	Jennifer Zorinsky, Chris Beza (SSHO), and Luke Councell	10-25°F, sunny, cold, snow starting at 17:00	<ul style="list-style-type: none"> <li>- AECOM held tailgate meeting. Reviewed scope of work, H&amp;S as well as daily PFAS sampling checklist.</li> <li>- Collected 10 soil samples using air knife techniques at 5 locations. One sample was collected from 0-2' and one sample from 2-4' at AOI2-HA1, AOI2-HA2, AOI2-HA3, AOI2-HA4, and AOI2-HA5. A duplicate sample was collected at AOI2-HA2-2-4. An MS/MSD was collected at AOI2-HA2-0-2.</li> <li>- Equipment blanks were collected on the digging bar at AOI2-HA1-0-2 and on the soil sampling device at AOI2-HA1-2-4.</li> <li>- AOI1-MW1 was drilled to 60' using roto sonic techniques. Water table was encountered at approximately 45-50'. Well location was left open and covered with a cone overnight to check static water level in the morning. Well will most likely not be a good producer.</li> <li>- Soil boring samples were collected from AOI1-MW1 at the surface, midpoint, and above the water table. Sample IDs were AOI1-SB1-0-2, AOI1-SB1-20-22, and AOI1-SB1-38-40. An MS/MSD was collected at AOI1-SB1-20-22.</li> </ul>	<ul style="list-style-type: none"> <li>- The ground is frozen from 1-2' bgs making air knifing and sampling difficult.</li> <li>- Core barrel became stuck at 43' bgs during drilling at AOI1-MW1. Downtime was approximately 1 hour.</li> <li>- Well at AOI1-MW1 does not appear to be a good producer. Borehole left open and covered with a cone overnight to check static water level in the morning.</li> <li>- Air knifing and hand augering was not possible from 0-2' due to frozen ground. Air knife locations were jackhammered from 0-2' and air knifed from 2--4'. Well installation was drilled without hand augering.</li> </ul>	Wells Installed: 0/6 Wells Developed: 0/6 Wells Sampled: 0/16 Soil Samples Collected: 18/29	Cascade (Brandon Pizzuti, David Donnelly, Aaron Bradley, Frank Scott, Caleb Trusty)
2/12/2019	Jennifer Zorinsky, Chris Beza (SSHO), and Luke Councell	5-30°F, mostly cloudy, cold	<ul style="list-style-type: none"> <li>- AECOM held tailgate meeting. Reviewed scope of work, H&amp;S as well as daily PFAS sampling checklist.</li> <li>- Collected 8 soil samples using air knife techniques at 4 locations. One sample was collected from 0-2' and one sample from 2-4' at AOI3-HA1, AOI1-HA1, AOI1-HA2, and AOI2-HA6. A duplicate sample was collected at AOI2-HA6-2-4.</li> <li>- Setup decon pad and deconned all drilling equipment.</li> </ul>	<ul style="list-style-type: none"> <li>- The ground is frozen from 1-2' bgs making air knifing and sampling difficult.</li> <li>- Pressure washer and steamer experienced freezing during decon due to weather. Received permission from MTARNG to store this equipment inside.</li> </ul>	Wells Installed: 0/6 Wells Developed: 0/6 Wells Sampled: 0/16 Soil Samples Collected: 8/29	Cascade (Brandon Pizzuti, David Donnelly, Aaron Bradley, Frank Scott, Caleb Trusty)



**Log of Daily Notice of Field Activity**  
**ARNG PFAS, Supplemental Site Inspection**  
**Fort William Henry Harrison, Helena, Montana**

Date	AECOM Personnel	Weather	Summary Daily Activities	Issues	Progress to Date	Subcontractor(s)/ Visitors
10/14/2020	- Bradley Ruff (SS) - Chris Beza (SSHO) - Jack Hollingsworth	Mostly cloudy, 48°, spotty showers, winds 20 mph E	- Collected two low-flow groundwater samples: AOI01-MW04 and AOI03-MW02. - Surveyed top of casing and ground surface elevation for the five newly installed monitoring wells. - Completed drum inventory: 11 liquid IDW drums and 18 solid IDW drums. - Stored extra buckets and equipment in warehouse; performed last of housekeeping. - AECOM mobilized off-site.	- None	- Soil Borings: 5/5 - Soil HA Locations: 17/17 - Soil Samples: 30/30 - Permanent Wells: 5/5 - Developed Wells: 5/5 - Groundwater Samples: 15/15	- None
10/13/2020	- Bradley Ruff (SS) - Chris Beza (SSHO) - Jack Hollingsworth	Cloudy, 54°, afternoon showers, winds 3 mph E	- Completed development of AOI01-MW04. - Collected three low-flow groundwater samples: AOI01-MW06, AOI2-MW2, and AOI03-MW02. - Performed site wide synoptic gauging at 25 monitoring wells.	- None	- Soil Borings: 5/5 - Soil HA Locations: 17/17 - Soil Samples: 30/30 - Permanent Wells: 5/5 - Developed Wells: 5/5 - Groundwater Samples: 13/15	- None
10/12/2020	- Bradley Ruff (SS) - Chris Beza (SSHO) - Jack Hollingsworth	Cloudy, 52°, winds 15 mph E	- Completed development at AOI01-MW05, AOI01-MW06, and AOI02-MW03. - Began development of AOI01-MW04. - Collected three low-flow groundwater samples: AOI01-MW2, AOI01-MW05, and AOI2-MW1.	- None	- Soil Borings: 5/5 - Soil HA Locations: 17/17 - Soil Samples: 30/30 - Permanent Wells: 5/5 - Developed Wells: 5/5 - Groundwater Samples: 10/15	- None
10/11/2020	- Bradley Ruff (SS) - Chris Beza (SSHO) - Jack Hollingsworth	Partly cloudy, cooler, 54°, winds 19 mph E	- Completed development at AOI03-MW2. Well was continually surged and purged dry three times removing approximately 21 gallons of water. - Began development of AOI01-MW5 and AOI01-MW06. - Collected three low-flow groundwater samples.	- None	- Soil Borings: 5/5 - Soil HA Locations: 17/17 - Soil Samples: 30/30 - Permanent Wells: 5/5 - Developed Wells: 2/5 - Groundwater Samples: 7/15	- None
10/10/2020	- Bradley Ruff (SS) - Chris Beza (SSHO) - Jack Hollingsworth	Sunny, warm, 77°, winds 15 mph E	- Mobilized to AOI02-MW3 and advanced boring via HSA. Two subsurface soil samples were collected: AOI02-MW3 was constructed with a 10 ft screen, filter pack, and bentonite chips to surface. The surface completion was a 2 ft x 2 ft pad with 8 inch monitoring well cover and skirt. All soil sampling, borings, and permanent monitoring well construction complete. - Began development of AOI3-MW2. Well was surged and purged dry three times removing approximately 15 gallons of water. Development will continue tomorrow. - Collected two low-flow groundwater samples at BH-02 and AOI01-MW3. - Cascade mobilized offsite.	- None	- Soil Borings: 5/5 - Soil HA Locations: 17/17 - Soil Samples: 30/30 - Permanent Wells: 5/5 - Developed Wells: 1/5 - Groundwater Samples: 4/15	- Cascade Team (Orville, Dax, and Jack)
10/9/2020	- Bradley Ruff (SS) - Chris Beza (SSHO) - Jack Hollingsworth	Sunny, warm, 77°, winds 8 mph N	- Completed well construction at AOI01-MW5 with a 10 ft screen (27-37 ft bgs), filter pack, and bentonite chips to surface. The surface completion was a 2 ft x 2 ft pad with 8 inch monitoring well cover and skirt. - Mobilized to AOI01-MW6 and advanced boring via HSA to 42 feet bgs. Two subsurface soil samples were collected: one at 15-17 ft bgs and another 30-32 ft bgs. AOI01-MW6 was constructed with a 10 ft screen (32-42 ft bgs), filter pack, and bentonite chips to surface. The surface completion was a 2 ft x 2 ft pad with 8 inch monitoring well cover and skirt. - Mobilized to AOI01-MW4 and began advancing boring. - Collected two low-flow groundwater samples at MW-11 and AOI3-MW1. - Mark Leeper (ARNG G9) mobilized offsite.	- None	- Soil Borings: 4/5 - Soil HA Locations: 17/17 - Soil Samples: 28/30 - Permanent Wells: 3/5 - Developed Wells: 0/5 - Groundwater Samples: 2/15	- Cascade Team (Orville, Dax, and Jack) - Mark Leeper

**Log of Daily Notice of Field Activity**  
**ARNG PFAS, Supplemental Site Inspection**  
**Fort William Henry Harrison, Helena, Montana**

Date	AECOM Personnel	Weather	Summary Daily Activities	Issues	Progress to Date	Subcontractor(s)/ Visitors
10/8/2020	- Bradley Ruff (SS) - Chris Beza (SSHO) - Jack Hollingsworth	Sunny, warm, 81°, winds 5-10 mph ENE	- Advanced boring AOI03-MW2 via HSA to 60 feet (ft) below ground surface (bgs). No additional soil samples were collected (per the QAPP). AOI03-MW2 was constructed with a 10 ft screen (50-60 ft bgs), filter pack, and bentonite chips to surface. The surface completion was a 2 ft x 2 ft pad with 8 inch monitoring well cover and skirt. - Mobilized rig to AOI01-MW5 and advanced boring via HSA to 45 ft bgs. Two subsurface soils samples were collected: one at 13-15 ft bgs and one at 33-35 ft bgs. Attempted to set well at 45 ft bgs, but encountered heaving sands. Cascade suggested the well sit overnight and attempt to complete the following morning.	- None	- Soil Borings: 2/5 - Soil HA Locations: 17/17 - Soil Samples: 24/30 - Permanent Wells: 1/5 - Developed Wells: 0/5 - Groundwater Samples: 0/15	- Cascade Team (Orville, Dax, and Jack) - Mark Leeper
10/7/2020	- Bradley Ruff (SS) - Chris Beza (SSHO) - Jack Hollingsworth	Sunny, warm, 74°, winds 5 mph WNW	- Completed utility identification and pre-clearing. AECOM completed the utility checklist and received approval to proceed with mechanized drilling. - Collected the remaining 11 surface soil samples from AOI 1 and AOI 3. - Complete pre-clearing all five boring/monitoring well locations. - Mobilized HSA drill rig to AOI03-MW2 and began drilling. Advanced 40 ft bgs before end of the day. - Scott Gestring and Terri Mavencamp (MTDEQ) visited the site to oversee soil sampling and drilling.	- None	- Soil Borings: 0/5 - Soil HA Locations: 17/17 - Soil Samples: 22/30 - Permanent Wells: 0/5 - Developed Wells: 0/5 - Groundwater Samples: 0/15	- Cascade Team (Orville, Dax, and Jack) - Mark Leeper - Scott Gestring - Terri Mavencamp
10/6/2020	- Bradley Ruff (SS) - Chris Beza (SSHO) - Jack Hollingsworth	Sunny, warm, 82°, winds 15 mph WNW	- Cascade drill team arrives onsite. - Utility identification and pre-clearing continued. - Collected 10 surface soil samples from borings and surface soil locations at FTA 4 (AOI 2), FTA 2 (AOI 3), and the McDonald Property (adjacent to Fort Harrison Main Gate). - Scott Gestring (MTDEQ) visited the site to oversee pre-clearing and the proposed sample locations. - Team decision made to shift AOI01-MW4 and AOI01-SS7 to the east of the proposed locations to be off of the Navy property. See 'Issues' for further details.	- Two samples at FTA 1 were located within the Navy property and were moved to the east, back on Fort Harrison property. This change was documented in FCR001 and is attached.	- Soil Borings: 0/5 - Soil HA Locations: 6/17 - Soil Samples: 10/30 - Permanent Wells: 0/5 - Developed Wells: 0/5 - Groundwater Samples: 0/15	- Cascade Team (Orville, Dax, and Jack) - Mark Leeper - Scott Gestring
10/5/2020	- Bradley Ruff (SS) - Chris Beza (SSHO) - Jack Hollingsworth	Sunny, warm, 75°	- AECOM performed site walk with Mark Leeper (ARNG G9), LTC Adel Johnson (MTARNG), and Wade Juntunen (MTARNG) and flagged locations across the facility. - Began utility identification and clearing (will be completed tomorrow).	- None	- Soil Borings: 0/5 - Soil HA Locations: 0/17 - Soil Samples: 0/30 - Permanent Wells: 0/5 - Developed Wells: 0/5 - Groundwater Samples: 0/15	- Mark Leeper

**Notes**

AOI = Area of Interest  
ARNG = Army National Guard  
bgs = below ground surface  
FCR = field change request  
FTA = fire training area  
ft = feet/foot  
HSA = hollow stem auger  
LTC = Lieutenant Colonel  
MTARNG = Montana Army National Guard  
MTDEQ = Montana Department of Environmental Quality  
mph = miles per hour  
SS = Site Supervisor  
SSHO = Site Safety and Health Officer

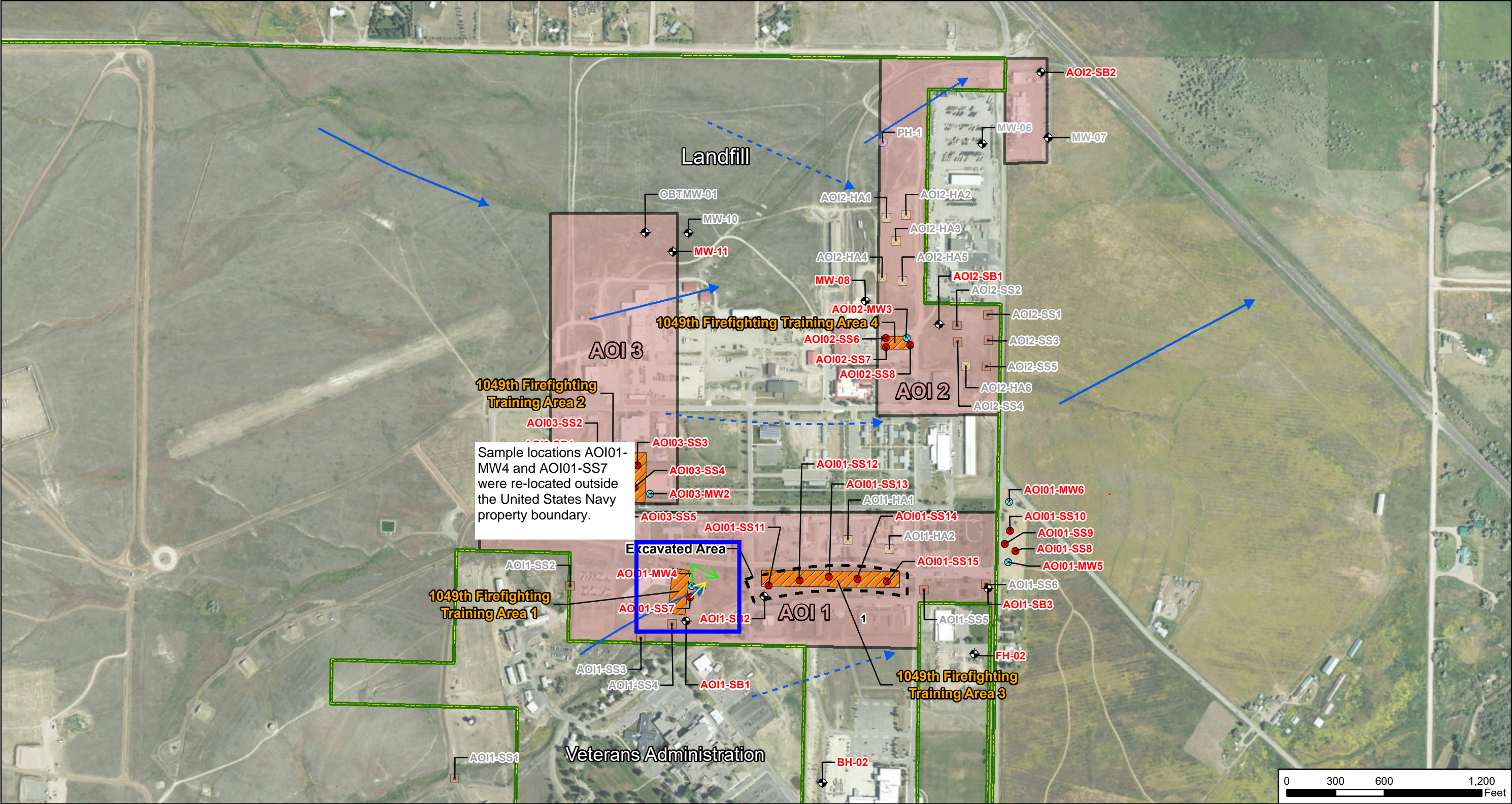
**AECOM Technical Services Inc.**  
**Field Change Request Form**


**Report Number:** FCR001 **Location:** FTWHH, MT  
**Document Title:** FTWHH SSI QAPP **Contract Number:** W912DR-12-D-0014  
Addendum, Final DO: W912DR17F0192

<i>Description of Field Change:</i>	Revised sample locations. 1. Sample locations AOI01-MW4 and AOI01-SS7 were re-located outside the United States Navy property boundary.
<i>Proposed Disposition:</i>	See attached map for revised sample locations.

**Submitted by:** Andrew Borden **Date:** 10/06/2020  
**Completed by:** Jady Harrington **Date:** 10/06/2020  
**Verified by**  
**(SI Task Manager):** Jady Harrington **Date:** 10/06/2020





CLIENT					ARNG					<div><div><div><div></div></div>Area of Interest</div><div><div></div></div>Potential PFAS Release</div> <div><div><div></div></div>Facility Boundary</div> <div><div><div></div></div>Surface Water Flow Direction</div> <div><div><div></div></div>Groundwater Flow Direction</div> <div><div>2019 SI Locations</div><div><div><div></div></div>Air Knifing Location</div><div><div><div></div></div>Monitoring Well</div><div><div><div></div></div>Existing Pumphouse Well</div><div><div><div></div></div>Surface Soil Location</div></div> <div><div>2020 SSI Locations</div><div><div><div></div></div>Proposed Monitoring Well</div><div><div><div></div></div>Proposed Soil Sample Location</div></div> <div><div>N</div><div></div></div>	SI Supplemental Sample Locations				
PROJECTSite Inspection for PFAS at Fort William Henry Harrison, MT											<div><div><div><div>AECOM</div></div><div>12420 Milestone Center Drive Germantown, MD 20876</div></div><div>Figure 17-1</div></div>				
REVISED					9/23/2020		GIS BY		MS			9/23/2020			
SCALE					1:7,200		CHK BY		JH			9/23/2020			
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community							PM		RG			9/23/2020			



## Appendix B2 Sampling Forms



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LOCATION	Site: FHH		LocID: AOI1-MW1		Date: 5-28-19								
	Project Name: ARNG PFAS		Project Number: 60552172		Recorded By: CB Checked By:								
EQUIPMENT	Development Equipment: Bladder Pump												
	Water Level Indicator Type/ID#:			Water Quality Meter Type: V-52									
	PID Type/ID#: 0			Equipment Decon:									
WELL INFO	Casing ID (inches) [a]: 2		Unit Casing Volume (gallon/linear foot) [b]:		Initial Depth to Water (FT BTOC) [c]: 31.41'								
	Total Well Depth (FT BTOC) [d]: 55'		Water Column Thickness (FT) [d-c]:		Well Volume (gallon) [(d-c) x b]:								
	Ground Condition of Well: stickup												
CASING INFO	Casing ID (inches) [a]:		1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0	Ambient PID (ppm):
	Unit Casing Volume (gal/linear foot) [b]:		0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6	Well Head PID (ppm): 0
Date (MM/DD/YY)	Time (24 hr)	Method (pump, surge, bail)	Depth to Water (BTOC)	Volume Removed (gallons)	Pumping Rate (Lpm)	Temp (°C)	Specific Conductivity (mS/cm)	pH	DO (mg/L)	Turbidity (NTU)	Sediment (mL/L)	Comment	
5-28-19	1202	bladder	31.40	0	95	13.98	0.784	7.54	7.45	--	190		
	1210		1	0.7	95	13.84	0.700	7.52	7.56	124.6	209		
	1220		31.41	1.7	95	13.83	0.806	7.53	7.66	90.4	210		
	1230		31.42	2.7	95	14.21	0.835	7.51	8.51	80.0	208		
	1240		31.40	4.0	230	13.14	0.898	7.51	8.21	40.6	216		
	1250		"	6.0	"	12.82	0.920	7.47	8.20	33.4	223		
	1300		"	8.0	"	12.89	0.930	7.50	8.32	26.1	227		
	1305		"	9.0	"	12.98	0.935	7.49	8.26	25.0	228		
	1310		"	10.0	"	12.95	0.944	7.47	8.24	24.8	231		
Sample Time 1310													







LOCATION	Site: FHH	LocID: AOI1-MW3	Date: 5-25-19									
	Project Name: ARNE PFAS	Project Number: 60552172	Recorded By: CB Checked By:									
EQUIPMENT	Development Equipment: Bladder Pump											
	Water Level Indicator Type/ID#:	Water Quality Meter Type: V-52										
	PID Type/ID#: 0	Equipment Decon:										
WELL INFO	Casing ID (inches) [a]: 2	Unit Casing Volume (gallon/linear foot) [b]: 0.163	Initial Depth to Water (FT BTOC) [c]: 32.66'									
	Total Well Depth (FT BTOC) [d]: 50'	Water Column Thickness (FT) [d-c]:	Well Volume (gallon) [(d-c) x b]:									
	Ground Condition of Well: Flush											
CASING INFO	Casing ID (inches) [a]:	1.5 2.0 2.2 3.0 4.0 4.3 5.0 6.0 7.0 8.0	Ambient PID (ppm):									
	Unit Casing Volume (gal/linear foot) [b]:	0.09 0.16 0.20 0.37 0.65 0.75 1.0 1.5 2.0 2.6	Well Head PID (ppm): 0									
Date (MM/DD/YY)	Time (24 hr)	Method (pump, surge, bail)	Depth to Water (BTOC)	Volume Removed (gallons)	Pumping Rate (Lpm)	Temp (°C)	Specific Conductivity (mS/cm)	pH	DO (mg/L)	Turbidity (NTU)	Sediment (mL/L)	Comment
16:45	5-25-19	Bladder	32.66	0	80	11.34	1.37	--	7.66	7000	143	
16:55			11	0.8	80	10.82	1.41	7.18	9.23	7100	131	
17:05			32.68	1.8	100	10.31	1.42	7.18	7.55	746	129	
17:15			11	2.8		10.30	1.40	7.25	7.41	550	131	
17:25			11	3.8		10.35	1.39	7.28	7.54	346	142	
17:35			11	4.8		10.30	1.42	7.26	6.80	231	145	
17:45			11	5.8		10.25	1.42	7.27	6.60	203	144	
17:55			11	6.8		10.27	1.42	7.24	7.44	144	150	
18:05			11	7.8		10.25	1.43	7.24	7.05	115	159	
18:15			11	8.8		10.19	1.42	7.26	7.45	99	159	
18:25			11	9.8		10.14	1.42	7.27	7.88	85.1	159	
18:35			11	10.8		10.15	1.42	7.23	7.30	65.4	162	
18:45			11	11.8		10.17	1.42	7.26	7.29	58.4	165	
18:50			11	12.8		10.15	1.42	7.25	7.19	54.5	167	
18:55			11	13.8		10.15	1.42	7.26	7.10	52.5	166	
Sample Time: 1900												

DEVELOPMENT CRITERIA: Measurements: every 5 minutes; Development is considered complete if water added during boring and well construction is removed and parameters are within the following criteria for 3 consecutive readings:  $\pm 1^{\circ}\text{C}$ ,  $\pm 5\%$  Conductivity;  $\pm 0.1$  pH; Turbidity  $\pm 10$  NTU for 30 minutes or  $< 50$  NTU and sediment  $< 0.75$  mL/L



LOCATION	Site: FHH		LocID: BH-2		Date: 5-28-19								
	Project Name: ARNG PFAS		Project Number: 60552172		Recorded By: CB Checked By:								
EQUIPMENT	Development Equipment: Bladder Pump		Water Quality Meter Type: V-52										
	Water Level Indicator Type/ID#:		Equipment Decon:										
	PID Type/ID#:												
WELL INFO	Casing ID (inches) [a]: 2		Unit Casing Volume (gallon/linear foot) [b]:		Initial Depth to Water (FT BTOC) [c]: 24.05'								
	Total Well Depth (FT BTOC) [d]: 33'		Water Column Thickness (FT) [d-c]:		Well Volume (gallon) {[d-c] x b}:								
	Ground Condition of Well: Flushmount												
CASING INFO	Casing ID (inches) [a]:		1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0	Ambient PID (ppm):
	Unit Casing Volume (gal/linear foot) [b]:		0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6	Well Head PID (ppm): 0
Date (MM/DD/YY)	Time (24 hr)	Method (pump, surge, bail)	Depth to Water (BTOC)	Volume Removed (gallons)	Pumping Rate (Lpm)	Temp (°C)	Specific Conductivity (mS/cm)	pH	DO (mg/L)	Turbidity (NTU)	ORP Sediment (mV)	Comment	
052819	1540	Bladder	24.23	0	280	12.96	1.41	7.39	10.40	17.8	227		
I	1550	I	24.20	2.8	I	12.59	1.43	7.31	10.20	13.9	228		
	1600		24.22	5.6		12.48	1.43	7.33	9.92	10.0	235		
	1610		"	8.4		12.50	1.42	7.27	9.80	3.7	235		
	1615		"	11.2		12.01	1.43	7.27	9.89	5.0	239		
	1620		"	12.6		11.91	1.43	7.32	9.80	0	238		
Sample Time 1625													



LOCATION	Site: FHH	LocID: FH-Z	Date: 5-28-19									
	Project Name: ARNG PFAS	Project Number: 60552172	Recorded By: CB Checked By:									
EQUIPMENT	Development Equipment: Bladder Pump											
	Water Level Indicator Type/ID#:	Water Quality Meter Type: V-52										
	PID Type/ID#: $\phi$	Equipment Decon:										
WELL INFO	Casing ID (inches) [a]: 2	Unit Casing Volume (gallon/linear foot) [b]:	Initial Depth to Water (FT BTOC) [c]: 34.34'									
	Total Well Depth (FT BTOC) [d]: 60.00'	Water Column Thickness (FT) [d-c]:	Well Volume (gallon) [(d-c) x b]:									
	Ground Condition of Well: Stickup											
CASING INFO	Casing ID (inches) [a]:	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0	Ambient PID (ppm):
	Unit Casing Volume (gal/linear foot) [b]:	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6	Well Head PID (ppm): $\phi$
Date (MM/DD/YY)	Time (24 hr)	Method (pump, surge, bail)	Depth to Water (BTOC)	Volume Removed (gallons)	Pumping Rate (Lpm)	Temp (°C)	Specific Conductivity (mS/cm)	pH	DO (mg/L)	Turbidity (NTU)	Sediment (mL/L)	Comment
858	→	Bladder	34.36	0.0	$\phi$							start pump
907	→		34.35	0.1	90	13.07	1.67	7.01	10.00	169	289	
910	→		34.36	0.4	90	12.29	1.74	7.01	10.70	167	295	
920	→		34.43	1.9	150	11.70	1.77	7.18	10.64	55.8	287	
5-28-19	930		34.48	3.4		11.55	1.78	7.21	10.38	50	284	
	940		34.45	4.9		11.53	1.78	7.25	11.01	55	285	
	950		34.47	6.4		11.45	1.78	7.22	10.89	54	284	
	955		34.46	7.2		11.49	1.78	7.27	10.72	43	286	
	1000		34.46	8.0		11.49	1.78	7.27	10.88	36.8	285	
Sample Time 1005												



## Monitoring Well Development Form

sampled

Page 1 of \_\_\_\_\_

[illegible]

**DEVELOPMENT CRITERIA:** Measurements: every 5 minutes; Development is considered complete if water added during boring and well construction is removed and parameters are within the following criteria for 3 consecutive readings:  $\pm 1^{\circ}\text{C}$ ,  $\pm 5\%$  Conductivity;  $\pm 0.1$  pH; Turbidity  $\pm 10$  NTU for 30 minutes or  $< 50$  NTU and sediment  $< 0.75$  mL/L

LOCATION	Site: <u>FTWHH</u>		LocID: <u>AOIZ-MW2</u>		Date: <u>5-30-19</u>								
	Project Name: <u>ARNG PFAS</u>		Project Number: <u>G0552172</u>		Recorded By: <u>LC</u> Checked By: <u>CB</u>								
EQUIPMENT	Development Equipment: <u>Bladder Pump</u>				Water Quality Meter Type: <u>Horiba U-52</u>								
	Water Level Indicator Type/ID#:				Equipment Decon:								
	PID Type/ID#:												
WELL INFO	Casing ID (inches) [a]: <u>2</u>		Unit Casing Volume (gallon/linear foot) [b]:		Initial Depth to Water (FT BTOC) [c]: <u>14.27'</u>								
	Total Well Depth (FT BTOC) [d]: <u>30'</u>		Water Column Thickness (FT) [d-c]:		Well Volume (gallon) [(d-c) x b]:								
	Ground Condition of Well:												
CASING INFO	Casing ID (inches) [a]:		1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0	Ambient PID (ppm):
	Unit Casing Volume (gal/linear foot) [b]:		0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6	Well Head PID (ppm): <u>0</u>
Date (MM/DD/YY)	Time (24 hr)	Method (pump, surge, bail)	Depth to Water (BTOC)	Volume Removed (gallons)	Pumping Rate (Lpm)	Temp (°C)	Specific Conductivity (mS/cm)	pH	DO (mg/L)	Turbidity (NTU)	Sediment (mL/L)	Comment	
<u>5-30-19</u>	<u>1020</u>	<u>Bladder</u>	<u>14.27</u>	<u>0</u>	<u>300</u>	<u>14.33</u>				<u>&gt;1000</u>	<u>ORP (mv)</u>	<u>cleaned flow cell</u>	
	<u>1025</u>		<u>14.27</u>	<u>1.5</u>	<u>300</u>	<u>11.28</u>	<u>0.630</u>	<u>7.45</u>	<u>9.70</u>	<u>84.2</u>	<u>-51</u>		
	<u>1030</u>		<u>14.27</u>		<u>300</u>								
	<u>1035</u>		<u>14.27</u>	<u>4.5</u>	<u>300</u>	<u>10.67</u>	<u>0.638</u>	<u>7.36</u>	<u>9.04</u>	<u>34.2</u>	<u>-40</u>		
	<u>1040</u>		<u>14.27</u>	<u>6.0</u>	<u>300</u>	<u>10.56</u>	<u>0.638</u>	<u>7.31</u>	<u>8.70</u>	<u>13.1</u>	<u>-32</u>		
	<u>1045</u>		<u>14.27</u>	<u>7.5</u>	<u>300</u>	<u>10.62</u>	<u>0.637</u>	<u>7.29</u>	<u>8.68</u>	<u>9.05</u>	<u>-26</u>		
	<u>1050</u>		<u>14.27</u>	<u>9.0</u>	<u>300</u>	<u>10.67</u>	<u>0.636</u>	<u>7.18</u>	<u>8.50</u>	<u>7.37</u>	<u>-20</u>		
	<u>1055</u>		<u>14.27</u>	<u>10.5</u>	<u>300</u>	<u>10.52</u>	<u>0.639</u>	<u>7.13</u>	<u>8.70</u>	<u>6.52</u>	<u>-15</u>		
Sample Time: <u>1100</u>													



## Monitoring Well Development Form

[illegible]

**DEVELOPMENT CRITERIA: Measurements:** every 5 minutes; Development is considered complete if water added during boring and well construction is removed and parameters are within the following criteria for 3 consecutive readings:  $\pm 1^{\circ}\text{C}$ ,  $\pm 5\%$  Conductivity;  $\pm 0.1$  pH; Turbidity  $\pm 10$  NTU for 30 minutes or  $< 50$  NTU and sediment  $< 0.75$  mL/L













Total Depth = 80

Sampled

Page \_\_\_\_ of \_\_\_\_

LOCATION	Site: F+WHH	LocID: MW-10	Date: 5/29/19
	Project Name: ARNG PRAI	Project Number: 60552172	Recorded By: ZC      Checked By:

[illegible]

**DEVELOPMENT CRITERIA: Measurements:** every 5 minutes; Development is considered complete if water added during boring and well construction is removed and parameters are within the following criteria for 3 consecutive readings:  $\pm 1^{\circ}\text{C}$ ,  $\pm 5\%$  Conductivity;  $\pm 0.1$  pH; Turbidity  $\pm 10$  NTU for 30 minutes or  $< 50$  NTU and sediment  $< 0.75$  mL/L



LOCATION	Site: FTWHH		LocID: MW11		Date: 5-30-19								
	Project Name: ARNG PFAS		Project Number: 60552172		Recorded By: LC      Checked By:								
EQUIPMENT	Development Equipment: Bladder Pump												
	Water Level Indicator Type/ID#:			Water Quality Meter Type: Horiba U-52									
	PID Type/ID#: $\phi$ $\phi$			Equipment Decon:									
WELL INFO	Casing ID (inches) [a]: 2		Unit Casing Volume (gallon/linear foot) [b]:		Initial Depth to Water (FT BTOC) [c]: 22.9'								
	Total Well Depth (FT BTOC) [d]:		Water Column Thickness (FT) [d-c]:		Well Volume (gallon) {[d-c] x b}:								
	Ground Condition of Well:												
CASING INFO	Casing ID (inches) [a]:		1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0	Ambient PID (ppm):
	Unit Casing Volume (gal/linear foot) [b]:		0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6	Well Head PID (ppm): $\phi$
Date (MM/DD/YY)	Time (24 hr)	Method (pump, surge, bail)	Depth to Water (BTOC)	Volume Removed (gallons)	Pumping Rate (Lpm)	Temp (°C)	Specific Conductivity (mS/cm)	pH	DO (mg/L)	Turbidity (NTU)	Sediment (mL/L) ORP	Comment	
5/30/19	830	LF-blvd.	27.93	1	0.250	11.39	1.52	6.94	10.83	31	292		
	835		27.91	2.25	0.250	11.19	1.53	7.24	10.41	11.3	277		
	840		27.91	3.5	0.250	11.17	1.53	7.28	10.36	9.42	276		
	845		27.91	4.75	0.250	11.13	1.53	7.29	10.29	7.21	274		
	850		27.91	6	0.250	11.19	1.53	7.31	9.89	4.75	271		
Sample Time 0855													



LOCATION	Site: FTWHH		LocID: OBTMW-01		Date: 5-30-19								
	Project Name: ARNG PFAS		Project Number: 60552172		Recorded By: CB Checked By:								
EQUIPMENT	Development Equipment: Sampling												
	Water Level Indicator Type/ID#:			Water Quality Meter Type: Horiba V-S2									
	PID Type/ID#: 0.0			Equipment Decon:									
WELL INFO	Casing ID (inches) [a]: 2		Unit Casing Volume (gallon/linear foot) [b]:		Initial Depth to Water (FT BTOC) [c]: 27.97'								
	Total Well Depth (FT BTOC) [d]: 55'		Water Column Thickness (FT) [d-c]:		Well Volume (gallon) {[d-c] x b}:								
	Ground Condition of Well: Grass												
CASING INFO	Casing ID (inches) [a]:		1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0	Ambient PID (ppm):
	Unit Casing Volume (gal/linear foot) [b]:		0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6	Well Head PID (ppm): 0
Date (MM/DD/YY)	Time (24 hr)	Method (pump, surge, bail)	Depth to Water (BTOC)	Volume Removed (gallons)	Pumping Rate m(Lpm)	Temp (°C)	Specific Conductivity (mS/cm)	pH	DO (mg/L)	Turbidity (NTU)	Sediment (mL/L)	Comment	
5-30-19	8:10	Bladder	28.15	0	300	10.72	0.836	6.94	11.48	12.9	275		
	8:20		28.20	3		10.53	0.830	7.22	10.69	71.8	265		
	8:30		"	6		10.47	0.830	7.33	10.42	61.9	262		
	8:40		"	9		10.50	0.830	7.40	10.38	27.1	261		
	8:45		28.21	10.5		10.55	0.832	7.39	10.28	13.9	262		
	8:50		"	12		10.55	0.831	7.39	10.29	11.7	261		
Sample Time: 8:55													

**DEVELOPMENT CRITERIA: Measurements:** every 5 minutes; Development is considered complete if water added during boring and well construction is removed and parameters are within the following criteria for 3 consecutive readings:  $\pm 1^{\circ}\text{C}$ ,  $\pm 5\%$  Conductivity;  $\pm 0.1$  pH; Turbidity  $\pm 10$  NTU for 30 minutes or  $< 50$  NTU and sediment  $< 0.75$  mL/L



**Pumping Rate:** < 0.5L/min; **Measurements:** every 3 - 5 minutes; **Stabilization is defined as the following for three consecutive readings:** + 3% Temp, + 3% Conductivity; + 10% DO; + 0.1 pH; + 10mV ORP; 10% Turb

[illegible]









# Monitoring Well Sample Collection Form

LOCATION		Site: FT WHH			LocID: MW-11			Date: 10/9/20					
		Project Name: FT WHH SSI			Project Number: 60552172			Recorded By: BR Checked By:					
EQUIPMENT		Sampling Equipment - Pump: GEOTECH BLADDER PUMP				Controller: GEOCONTROL		Compressor: GEOCONTROL					
		Water Level Indicator Type/ID#: GEOTECH			Water Quality Meter Type: HORIBA Sonde ID: 44529			Handset ID: 19350					
		PID Type/ID#:			Equipment Decon:								
WELL & SAMPLING INFO		Description: STICKUP		Screen Interval (BTOC): UNKNOWN		Initial Depth to Water (BTOC): 29.30		Ambient PID (ppm):					
		Historic Pump Settings:				Pump Inlet Depth (BTOC): 52'		Well Head PID (ppm):					
		Condition of Well/Comments: GOOD				Height of stick-up (ft): ~2'							
		NOTE: TD: 57.22' WC: 27.92'											
		SHAKE TEST NEGATIVE											
Date (MM/DD/YY)	Time (24 hr)	Depth to Water (BTOC)	Volume Removed (gallons)	Pumping Rate (Lpm)	Temp (°C)	Specific Conductivity (mS/cm)	DO (mg/L)	pH	ORP (mV)	Turbidity (NTU)	Pump Refill/Discharge (seconds)	Pump Pressure (PSI)	Comment
10/9/20	1400	29.3	1	200	17.10	1.10	3.87	7.08	100	250	20	30	
	1405	29.3	2	200	15.30	1.07	2.33	7.41	105	277			
	1410	29.3	3	200	14.74	1.07	3.02	7.44	110	164			
	1415	29.3	4	200	14.72	1.06	4.15	7.51	113	118			
	1420	29.3	5	200	14.73	1.06	4.06	7.53	114	111			
	1425	29.3	6	200	14.39	1.06	3.75	7.54	118	82.9			
	1430	29.3	7	200	14.13	1.06	4.46	7.57	119	68.0			
	1435	29.3	8	200	13.95	1.07	4.04	7.62	119	64.9			
	1440	29.3	9	200	14.00	1.06	4.04	7.63	122	56.4			
	1445	29.3	10	200	13.92	1.06	4.81	7.61	125	55.4			

**Pumping Rate:** < 0.5L/min; **Measurements:** every 3 - 5 minutes; **Stabilization is defined as the following for three consecutive readings:** + 3% Temp, + 3% Conductivity; + 10% DO; + 0.1 pH; + 10mV ORP; 10% Turb

[illegible]





## Monitoring Well Sample Collection Form

[illegible]

**Pumping Rate:** < 0.5L/min; **Measurements:** every 3 - 5 minutes; **Stabilization is defined as the following for three consecutive readings:** + 3% Temp; + 3% Conductivity; + 10% DO; + 0.1 pH; + 10mV ORP; 10% Turb

[illegible]



# Monitoring Well Sample Collection Form

Page 1 of \_\_\_\_

LOCATION	Site: FT WHH	LocID: A011-MW3	Date: 10/10/20											
	Project Name: FT WHH SSI	Project Number: 60552172	Recorded By: TBR Checked By:											
EQUIPMENT	Sampling Equipment - Pump: GEDTECH	Controller: GEDCONTROL	Compressor: GEDCONTROL											
	Water Level Indicator Type/ID#: GEDTECH	Water Quality Meter Type: 3240-185	Sonde ID: 44529 Handset ID: 19350											
	PID Type/ID#:	Equipment Decon:												
WELL & SAMPLING INFO	Description: FLUSH MOUNT	Screen Interval (BTOC): 40-50'	Initial Depth to Water (BTOC): 32.04											
	Historic Pump Settings:		Pump Inlet Depth (BTOC): 45'											
	Condition of Well/Comments: GOOD		Height of stick-up (ft): FLUSH											
	NOTE: DTB: 49.85' WC: 17.81' SHAKE TEST NEGATIVE.													
Date (MM/DD/YY)	Time (24 hr)	Depth to Water (BTOC)	Volume Removed (gallons)	Pumping Rate (Lpm)	Temp (°C)	Specific Conductivity (mS/cm)	DO (mg/L)	pH	ORP (mV)	Turbidity (NTU)	Pump Refill/Discharge (seconds)	Pump Pressure (PSI)	Comment	
	1520	32.05	1	0.2	17.68	1.23	4.76	7.81	152	670	20	10	28	
	1525	32.05	2		14.92	1.29	5.37	7.61	155	357				
	1530	32.05	3		14.23	1.31	5.17	7.59	154	230				
	1535	32.05	4		13.85	1.31	5.13	7.58	154	197				
	1540	32.05	5		13.71	1.31	5.15	7.57	155	154				
	1545	32.05	6		13.60	1.31	5.22	7.58	155	102				
	1550	32.05	7		13.56	1.32	5.20	7.57	155	79.2				
	1555	32.05	8		13.62	1.32	5.25	7.57	155	57.8				
	1600	32.05	9		13.56	1.32	5.20	7.57	155	49.0				
	1605	32.05	10		13.60	1.32	5.18	7.56	156	44.8				
	1610	32.05	11		13.54	1.32	5.15	7.56	156	40.5				

Pumping Rate:  $\leq 0.5$  L/min; Measurements: every 3-5 minutes; Stabilization is defined as the following for three consecutive readings:  $\pm 3\%$  Temp,  $\pm 3\%$  Conductivity;  $\pm 10\%$  DO;  $\pm 0.1$  pH;  $\pm 10$  mV ORP; 10% Turb

Sample ID Numbers and Sample Time	Container Count, Volume & Type	Preservative	Parameter(s)
A011-MW3-GW 1610	2 125 mL HDPE	NONE	PFAS
A011-MW3-GW-DUP 1610	2 125 mL HDPE	NONE	PFAS
A011-MW3-GW-MS 1610	2 125 mL HDPE	NONE	PFAS
A011-MW3-GW-MSD 1610	2 125 mL HDPE	NONE	PFAS



## Monitoring Well Sample Collection Form

LOCATION	Site: FW HH SS)	LocID: A0101-MW4	Date: 10/14/20
	Project Name: ARNG PFAS	Project Number: 60552172	Recorded By: JH Checked By:
EQUIPMENT	Sampling Equipment - Pump: Geotech Bladder pump		Controller: GeoControl Pro
	Water Level Indicator Type/ID#: Geotech Interface Probe/4675	Water Quality Meter Type: U-52	Sonde ID: 25314
	PID Type/ID#: N/A	Handset ID: 18454	
	Equipment Decon: Liquinox		
WELL & SAMPLING INFO	Description: Flush mount	Screen Interval (BTOC): 28-38	Initial Depth to Water (BTOC): 29.39
	Historic Pump Settings: N/A - new	Pump Inlet Depth (BTOC): 36	Ambient PID (ppm): N/A
	Condition of Well/Comments: grassy area near ditch	Well Head PID (ppm): N/A	
	NOTE: TD = 38.02 ft btoC	Height of stick-up (ft): 0.50 ft bgs	

[illegible]

**Pumping Rate:** < 0.5L/min; **Measurements:** every 3-5 minutes; **Stabilization** is defined as the following for three consecutive readings: + 3% Temp, + 3% Conductivity; + 10% DO; ± 0.1 pH; ± 10mV ORP; 10% Turb

Sample ID Numbers and Sample Time	Container Count, Volume & Type	Preservative	Parameter(s)
34 <del>A0101-ANW</del>	2 x 125 mL HDPE	None	PFAS
A0101-MW04-GW C0935			
Shake test ⊖			

[illegible]



## Monitoring Well Sample Collection Form

LOCATION	Site: FW44SS1	LocID: A0101-MW6	Date: 10/13/20
	Project Name: ARNG PFAS	Project Number: 60552172	Recorded By: JH Checked By:
EQUIPMENT	Sampling Equipment - Pump: Geotech Bladder Pump		Controller: GeoControl Pro
	Water Level Indicator Type/ID#: Geotech Interface Probe/4624	Water Quality Meter Type: U-S2	Sonde ID: 25314
	PID Type/ID#: N/A	Compressor: GeoControl Pro	
WELL & SAMPLING INFO	Handset ID: 18454		Equipment Decon: Liquinox
	Description: Flush mount	Screen Interval (BTOC): 27-37	Initial Depth to Water (BTOC): 29.82
	Historic Pump Settings: N/A - new well	Pump Inlet Depth (BTOC): JH 37.5 ft	Ambient PID (ppm):
	Condition of Well/Comments: Flush mount, grassy area	Well Head PID (ppm):	
	NOTE: Flush mount	Height of stick-up (ft): #4.46 in = 0.37 ft lgs	
	TD = 37.01 ft btoe		

Date (MM/DD/YY)	Time (24 hr)	Depth to Water (BTWC)	Volume Removed (gallons)	Pumping Rate (Lpm)	Temp (°C)	Specific Conductivity (mS/cm)	DO (mg/L)	pH	ORP (mV)	Turbidity (NTU)	Pump Refill/ Discharge (seconds)	Pump Pressure (PSI)	Comment
10/13/20	1246	29.97		60	14.19	0.644	7.28	7.38	139	800	25/15	28	
	1251	30.02		70	12.458	1.45	7.15	7.14	11	580	20/15	27	
	1256	30.22			12.20	1.45	6.00	7.03	17	280			
	1301	30.25			12.03	1.44	6.28	7.03	28	206			
	1306	30.356			11.83	1.44	6.45	7.08	41	159			
	1311	30.41			11.69	1.44	6.62	7.12	49	129			
	1316	30.49			11.59	1.44	6.71	7.15	54	103			
	1321	30.52			11.47	1.45	6.79	7.16	56	81.2			
	1326	30.56	1		11.38	1.45	6.59	7.17	57	66.6			
	1331	30.59			11.38	1.46	6.69	7.15	57	56.7			
↓	1336	30.63		↓	11.37	1.46	6.63	7.11	57	50.2	↓	↓	

**Pumping Rate:** < 0.5L/min; **Measurements:** every 3 - 5 minutes; **Stabilization is defined as the following for three consecutive readings:** + 3% Temp, + 3% Conductivity; + 10% DO; ± 0.1 pH; ± 10mV ORP; 10% Turb

[illegible]



# Monitoring Well Sample Collection Form

Page 2 of 2

LOCATION	Site: FWHH-SSI	LocID: A0101-MW6	Date: 10/13/20										
	Project Name: 60552172 ARNCP PFAS	Project Number: 60552172	Recorded By: JH										
			Checked By:										
Date (MM/DD/YY)	Time (24 hr)	Depth to Water (BTOC)	Volume Removed (gallons)	Pumping Rate (Lpm)	Temp (°C)	Specific Conductivity (mS/cm)	DO (mg/L)	pH	ORP (mV)	Turbidity (NTU)	Pump Refill/Discharge (seconds)	Pump Pressure (PSI)	Comment
10/13/20	1341	30.73	1	70	11.37	1.46	6.61	7.07	58	39.8	20	27	
	1346	30.71			11.39	1.46	6.53	7.05	58	35.2			
	1351	30.72			11.39	1.47	6.54	7.03	58	32.8			
	1354		1.5		11.39	1.47	6.43	7.02	58	32.9			
	1358												
SAMPLED													

Pumping Rate:  $\leq 0.5$  L/min; Measurements: every 3 - 5 minutes; Stabilization is defined as the following for three consecutive readings:  $\pm 3\%$  Temp,  $\pm 3\%$  Conductivity;  $\pm 10\%$  DO;  $\pm 0.1$  pH;  $\pm 10$  mV ORP;  $10\%$  Turb



## Monitoring Well Sample Collection Form

<b>LOCATION</b>		Site: FT WHH				LocID: A012-MW1				Date: 10/12/20			
		Project Name: FTWHH SSI				Project Number: 60552172				Recorded By: TBL		Checked By:	
<b>EQUIPMENT</b>		Sampling Equipment - Pump: GEOTECH						Controller: GEDCONTROL		Compressor: GEDCONTROL			
		Water Level Indicator Type/ID#: GEOTECH				Water Quality Meter Type: HORIBA Sonde ID: 44529				Handset ID: 19350			
		PID Type/ID#:				Equipment Decon:							
<b>WELL &amp; SAMPLING INFO</b>		Description: STICKUP				Screen Interval (BTOC): 28-38		Initial Depth to Water (BTOC): 22.83		Ambient PID (ppm):			
		Historic Pump Settings:				BES:		Pump Inlet Depth (BTOC): 35'		Well Head PID (ppm):			
		Condition of Well/Comments: GOOD						Height of stick-up (ft): ~3.1'					
		NOTE: DTB: 39.85 SOFT BOTTOM WC: 17.02 SHAKE TEST NEGATIVE											
Date (MM/DD/YY)	Time (24 hr)	Depth to Water (BTOC)	Volume Removed (gallons)	Pumping Rate (Lpm)	Temp (°C)	Specific Conductivity (mS/cm)	DO (mg/L)	pH	ORP (mV)	Turbidity (NTU)	Pump Refill/Discharge (seconds)	Pump Pressure (PSI)	Comment
	1500	22.83	1	0.2	12.41	1.69	6.94	7.42	114	120	7/40	30	
	1505	22.83	2		12.30	1.70	6.77	7.40	118	72.7			
	1510	22.83	3		12.26	1.70	6.70	7.37	122	44.1			
	1515	22.83	4		12.17	1.71	6.87	7.34	127	31.5			
	1520	22.83	5		12.00	1.72	7.10	7.32	132	10.0			
	1525	22.83	6		12.10	1.71	6.93	7.32	135	7.3			
	1530	22.83	7		12.06	1.71	6.88	7.31	137	2.7			
	1535	22.83	8		11.94	1.72	7.21	7.32	139	2.3			
	1540	22.83	9		11.90	1.72	7.19	7.34	139	1.4			
				V							V	V	

**Pumping Rate:** < 0.5L/min; **Measurements:** every 3 - 5 minutes; **Stabilization is defined as the following for three consecutive readings:** + 3% Temp, + 3% Conductivity; + 10% DO; + 0.1 pH; + 10mV ORP; 10% Turb

[illegible]

## Monitoring Well Sample Collection Form

LOCATION	Site: FT WHH				LocID: A012-MW2				Date: 10/13/20				
	Project Name: FT WHH SS1				Project Number: 60552172				Recorded By: FBR		Checked By:		
EQUIPMENT	Sampling Equipment - Pump: GEDTECH				Controller: GEDCONTROL				Compressor: GEDCONTROL				
	Water Level Indicator Type/ID#: GEDTECH				Water Quality Meter Type: HORIBA Sonde ID: 44529				Handset ID: 19350				
	PID Type/ID#:				Equipment Decon:								
WELL & SAMPLING INFO	Description: FLUSHMOUNT			Screen Interval (BTOC): 20-30			Initial Depth to Water (BTOC): 17.33			Ambient PID (ppm):			
	Historic Pump Settings:			BES			Pump Inlet Depth (BTOC): 25'			Well Head PID (ppm):			
	Condition of Well/Comments: GOOD						Height of stick-up (ft): FLUSH						
	NOTE: DTB: 28.70 SOFT BOTTOM WL: 11.37 6000 PRODUCER, NO DRAWDOWN @ 70.5 LPM. SHAKE TEST NEGATIVE												
Date (MM/DD/YY)	Time (24 hr)	Depth to Water (BTOC)	Volume Removed (gallons)	Pumping Rate (Lpm)	Temp (°C)	Specific Conductivity (mS/cm)	DO (mg/L)	pH	ORP (mV)	Turbidity (NTU)	Pump Refill/Discharge (seconds)	Pump Pressure (PSI)	Comment
	0920	17.33	1	200	10.85	0.590	8.61	7.29	200	495	5/20	20	
	0925		2		10.71	0.592	8.62	7.35	198	354			
	0930		3		10.63	0.594	8.59	7.38	196	277			
	0935		4		10.55	0.595	8.57	7.40	195	201			
	0940		5		10.39	0.596	8.61	7.42	194	159			
	0945		6		10.43	0.598	8.57	7.43	193	134			
	0950		7		10.35	0.599	8.57	7.44	192	112			
	0955		8		10.36	0.600	8.56	7.45	191	89.9			
	1000		9		10.34	0.600	8.53	7.45	190	78.7			
	1005		10		10.34	0.601	8.48	7.45	190	63.7			
	1010		11		10.35	0.602	8.52	7.45	189	60.5			CONTINUED ON

**Pumping Rate:** < 0.5L/min; **Measurements:** every 3 - 5 minutes; **Stabilization is defined as the following for three consecutive readings:** + 3% Temp; + 3% Conductivity; + 10% DO; + 0.1 pH; + 10mV ORP; 10% Turb

[illegible]



# Monitoring Well Sample Collection Form

Page \_\_\_\_ of \_\_\_\_

[illegible]

**Pumping Rate:**  $\leq 0.5\text{L/min}$ ; **Measurements:** every 3 - 5 minutes; **Stabilization is defined as the following for three consecutive readings:**  $\pm 3\%$  Temp,  $\pm 3\%$  Conductivity;  $\pm 10\%$  DO;  $\pm 0.1\text{ pH}$ ;  $\pm 10\text{mV ORP}$ ;  $10\%$  Turb



EQUIPMENT	Sampling Equipment - Pump: <u>Geotech Bladder Pump</u>		Controller: <u>Geo Control Pro</u>	Compressor: <u>Geo Control Pro</u>
	Water Level Indicator Type/ID#: <u>Geotech Interface Probe/4678</u>	Water Quality Meter Type: <u>V-S2</u> Sonde ID: <u>25314</u>		Handset ID: <u>18454</u>
	PID Type/ID#: <u>N/A</u>	Equipment Decon: <u>Liquinox</u>		

WELL & SAMPLING INFO	Description: <u>Flush mount</u>	Screen Interval (BTOC): <u>30-40</u>	Initial Depth to Water (BTOC): <u>74.22</u>	Ambient PID (ppm): <u>N/A</u>
	Historic Pump Settings: <u>N/A - new</u>		Pump Inlet Depth (BTOC): <u>36</u>	Well Head PID (ppm): <u>N/A</u>
	Condition of Well/Comments: <u>gravel parking lot</u>		Height of stick up (ft): <u>0.36 ft bgs</u>	
	NOTE: <u>TD = 39.94 ft btoc</u>			

Date (MM/DD/YY)	Time (24 hr)	Depth to Water (BTWC)	Volume Removed (gallons)	Pumping Rate (Lpm)	Temp (°C)	Specific Conductivity (mS/cm)	DO (mg/L)	pH	ORP (mV)	Turbidity (NTU)	Pump Refill/ Discharge (seconds)	Pump Pressure (PSI)	Comment
10/14/20	1052	24.04		240	11.98	1.74	6.49	7.26	24	692	15/15	26	Pump on @ 1048
	1057	24.11			11.66	1.77	5.14	6.67	34	800			
	1102				11.57	1.77	5.11	6.61	44	685			
	1107				11.40	1.77	5.36	6.60	54	432			
	1112		1		11.49	1.77	6.23	6.73	56	295			
	1117				11.44	1.77	6.17	6.59	62	231			
	1122				11.43	1.77	6.39	6.56	65	176			
	1127				11.48	1.77	6.12	6.47	68	130			
	1132				11.50	1.99	6.13	6.45	70	93.4			U-52 lost its seal, stopped
	1132				11.50	1.78	6.49	6.80	62	89.9			pump to fix.
	1147				11.50	1.77	6.40	6.57	68	59.1			

**Pumping Rate:** < 0.5L/min; **Measurements:** every 3 - 5 minutes; **Stabilization is defined as the following for three consecutive readings:** + 3% Temp, + 3% Conductivity; + 10% DO; ± 0.1 pH; + 10mV ORP; 10% Turb

[illegible]





# Monitoring Well Sample Collection Form

Page 2 of 2

LOCATION	Site: FWHT SSI	LocID: A0102-MW3	Date: 10/14/20																						
	Project Name: ARNG PFAS	Project Number: 60552172	Recorded By: JH																						
Date (MM/DD/YY)	Time (24 hr)	Depth to Water (BTOC)	Volume Removed (gallons)	Pumping Rate (Lpm)	Temp (°C)	Specific Conductivity (mS/cm)	DO (mg/L)	pH	ORP (mV)	Turbidity (NTU)	Pump Refill/Discharge (seconds)	Pump Pressure (PSI)	Comment												
10/14/20	1152	24.11	2.5	240	11.84	1.78	6.49	6.54	68	46.7	15/15	26													
10/14/20	1157	↓	3.54	↓	11.62	1.78	6.32	6.48	69	34.0	↓	↓													
	1202	↓	3	↓	11.59	1.78	6.31	6.46	71	38.8	↓	↓													
	1207	↓		↓	11.33	1.78	6.52	6.41	70	25.4	↓	↓													
	1211	↓	3.5	↓	11.36	1.78	6.30	6.57	69	24.8	↓	↓													
	1215	↓		↓	11.51	1.78	6.38	6.54	71	23.1	↓	↓													
	1218	↓	4	↓	11.62	1.78	6.55	6.49	73	23.1	↓	↓													
	1220	—	4.5	—	SAMPLED																				
<div>Handwritten signature and initials</div>																									

Pumping Rate: ≤0.5L/min; Measurements: every 3 - 5 minutes; Stabilization is defined as the following for three consecutive readings: ± 3% Temp; + 3% Conductivity; + 10% DO; + 0.1 pH; + 10mV ORP; 10% Turb

## Monitoring Well Sample Collection Form

[illegible]

**Pumping Rate:** < 0.5L/min; **Measurements:** every 3 - 5 minutes; **Stabilization** is defined as the following for three consecutive readings:  $\pm 3\%$  Temp,  $\pm 3\%$  Conductivity;  $\pm 10\%$  DO;  $\pm 0.1$  pH;  $\pm 10$ mV ORP;  $10\%$  Turb

[illegible]





## **Appendix B3**

### **Field Change Request**



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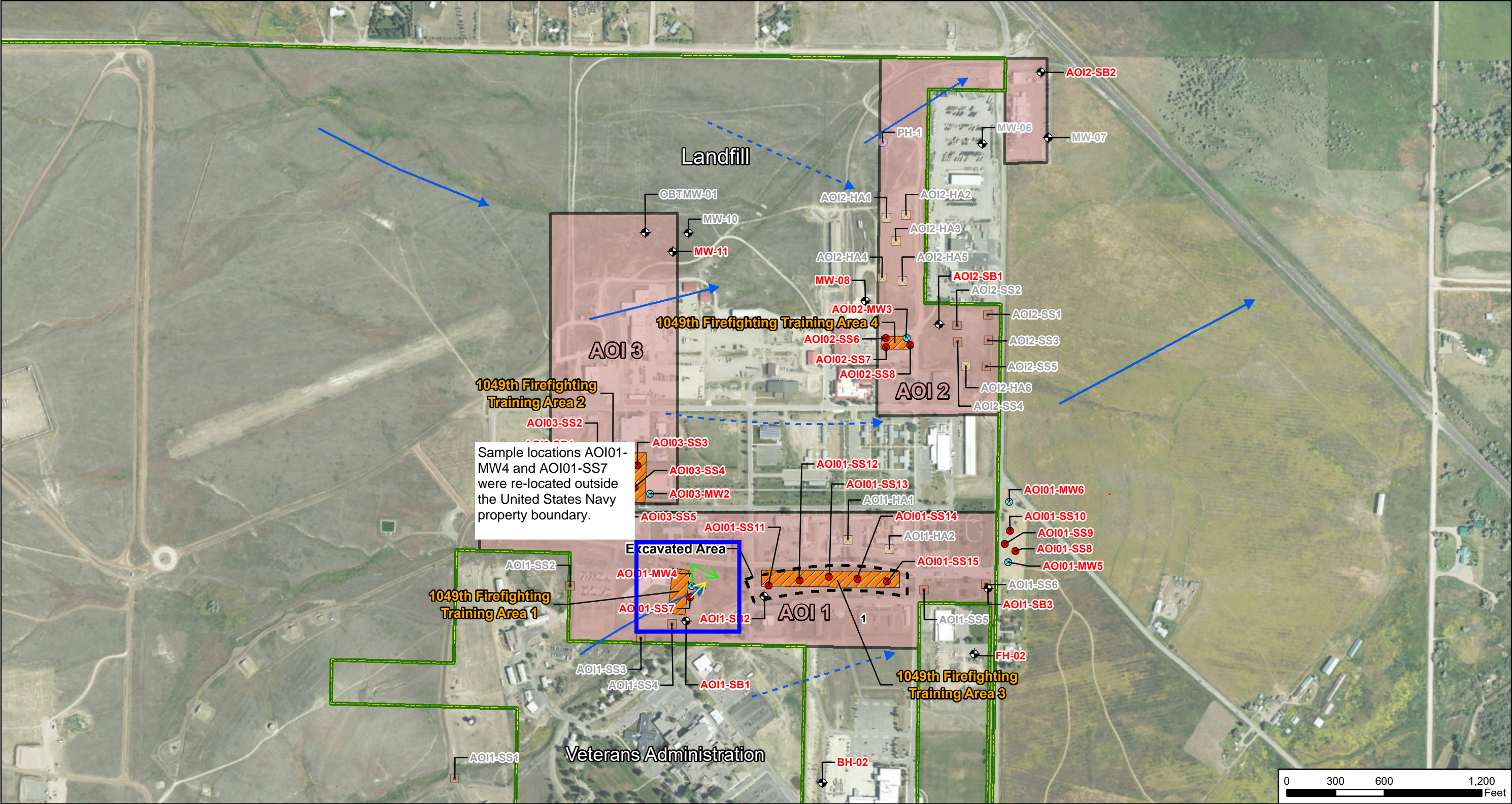
**AECOM Technical Services Inc.**  
**Field Change Request Form**

**Report Number:** FCR001 **Location:** FTWHH, MT  
**Document Title:** FTWHH SSI QAPP **Contract Number:** W912DR-12-D-0014  
Addendum, Final DO: W912DR17F0192

<i>Description of Field Change:</i>	Revised sample locations. 1. Sample locations AOI01-MW4 and AOI01-SS7 were re-located outside the United States Navy property boundary.
<i>Proposed Disposition:</i>	See attached map for revised sample locations.

**Submitted by:** Andrew Borden **Date:** 10/06/2020  
**Completed by:** Jady Harrington **Date:** 10/06/2020  
**Verified by**  
**(SI Task Manager):** Jady Harrington **Date:** 10/06/2020





CLIENT ARNG					<div><div><div></div>Area of Interest</div><div><div></div>Potential PFAS Release</div><div><div></div>Facility Boundary</div><div><div></div>Surface Water Flow Direction</div><div><div></div>Groundwater Flow Direction</div></div> <div><div>2019 SI Locations</div><div><div><div></div>Air Knifing Location</div><div><div></div>Monitoring Well</div><div><div></div>Existing Pumphouse Well</div><div><div></div>Surface Soil Location</div></div></div> <div><div>2020 SSI Locations</div><div><div><div></div>Proposed Monitoring Well</div><div><div></div>Proposed Soil Sample Location</div></div></div>					<div><div>N</div><div></div></div>	SI Supplemental Sample Locations	
PROJECT Site Inspection for PFAS at Fort William Henry Harrison, MT					<div><div><div>AECOM</div><div>12420 Milestone Center Drive Germantown, MD 20876</div></div><div>Figure 17-1</div></div>							
REVISED 9/23/2020		GIS BY MS	9/23/2020									
SCALE 1:7,200		CHK BY JH	9/23/2020									
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM RG	9/23/2020									



## Appendix B4 Survey Data



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	NAD83 Montana State Plane (Meters)		NAVD88 (Meters)			NAD83 Montana State Plane (US Feet)		NAVD88 (US Feet)
Monitoring Well	Northing	Easting	Elevation		Monitoring Well	Northing	Easting	Elevation
OBTMW-01	267497.022	400770.260	1213.887		OBTMW-01	877613.145	1314860.426	3982.56
100n (Unknown well)	266531.141	401103.547	1209.353		100n	874444.250	1315953.885	3967.68
101n (Unknown well)	267467.597	400785.605	1214.448		101n	877516.606	1314910.772	3984.40
103n (Unknown well)	267630.881	400743.135	1215.008		103n	878052.314	1314771.434	3986.24
104n (Unknown well)	267687.847	400824.437	1213.538		104n	878239.210	1315038.174	3981.41
105n (Unknown well)	267703.486	400947.258	1211.727		105n	878290.520	1315441.127	3975.47
AOI2-MW2	267798.177	401512.485	1202.938		AOI2-MW2	878601.186	1317295.543	3946.64
AOI1-MW1	266767.303	400846.490	1214.911		AOI1-MW1	875219.058	1315110.524	3985.92
AOI1-MW2	266814.030	400993.271	1211.986		AOI1-MW2	875372.362	1315592.090	3976.32
AOI1-MW3	266829.155	401413.141	1203.581		AOI1-MW3	875421.986	1316969.613	3948.75
AOI2-MW1	267325.136	401321.387	1204.215		AOI2-MW1	877049.217	1316668.584	3950.83
AOI3-MW1	267049.613	400664.748	1220.247		AOI3-MW1	876145.272	1314514.261	4003.43
BH-02	266464.248	401102.623	1209.467		BH-02	874224.787	1315950.854	3968.06
FH-02	266705.708	401387.716	1205.470		FH-02	875016.977	1316886.198	3954.95
MW-05 (Unknown well)	267670.122	401313.294	1205.481		MW-05	878181.059	1316642.030	3954.98
MW-06	267664.173	401402.622	1204.739		MW-06	878161.539	1316935.101	3952.55
MW-07	267675.132	401526.336	1203.476		MW-07	878197.494	1317340.986	3948.40
MW-08	267369.169	401183.186	1206.757		MW-08	877193.680	1316215.168	3959.17
MW-10	267496.453	400850.955	1212.221		MW-10	877611.278	1315125.175	3977.10
MW-11	267461.248	400821.793	1213.470		MW-11	877495.776	1315029.498	3981.19
MW-12 (Unknown well)	267539.643	400830.324	1213.250		MW-12	877752.979	1315057.488	3980.47

Well ID	Northing	Easting	TOC	Ground
AOI1-MW1	875220.810	1315113.156	3985.928	
AOI1-MW2	875374.114	1315594.721	3976.332	
AOI1-MW3	875423.737	1316972.247	3948.757	
AOI01-MW04	875496.685	1315327.696	3975.455	3975.628
AOI01-MW05	875592.893	1317100.063	3947.701	3947.993
AOI01-MW06	875975.687	1317096.927	3948.092	3948.432
AOI01-SS7	875484.131	1315277.494		3975.193
AOI01-SS8	875692.713	1317131.160		3947.390
AOI01-SS9	875747.408	1317073.586		3947.845
AOI01-SS10	875842.198	1317080.696		3947.635
AOI01-SS11	875409.363	1315601.501		3969.618
AOI01-SS12	875442.543	1315696.218		3961.785
AOI01-SS13	875451.320	1315980.835		3957.691
AOI01-SS14	875461.572	1316206.608		3952.336
AOI01-SS15	875467.984	1316284.886		3952.473
AOI2-MW1	877050.971	1316671.217	3950.837	
AOI2-MW2	878602.943	1317298.179	3946.647	
AOI02-MW03	876961.658	1316453.436	3953.356	3953.680
AOI02-SS6	876962.875	1316216.825		3959.411
AOI02-SS7	876890.704	1316221.714		3960.062
AOI02-SS8	876879.669	1316446.436		3954.411
AOI3-MW1	876147.024	1314516.890	4003.435	
AOI03-MW02	875991.588	1314899.271	3993.341	3993.621
AOI03-SS1	876032.448	1314544.505		3999.524
AOI03-SS2	876115.998	1314543.599		3997.319
AOI03-SS3	876219.826	1314834.194		3991.861
AOI03-SS4	875955.464	1314806.367		3994.966
AOI03-SS5	875923.499	1314808.929		3995.775
MW-05	878182.815	1316644.665	3954.990	
MW-06	878163.297	1316937.736	3952.556	
MW-07	878199.252	1317343.622	3948.412	
MW-08	877195.436	1316217.802	3959.177	
MW-10	877613.035	1315127.805	3977.133	
MW-11	877497.533	1315032.129	3981.201	
MW-12	877754.734	1315060.118	3980.479	
BH-02	874226.535	1315953.488	3968.068	
FH-02	875018.727	1316888.832	3954.954	
OBTMW-01	877614.902	1314863.058	3982.569	
Flushmount1	874446.001	1315956.519	3967.694	
Stickup1	877518.363	1314913.402	3984.409	
Stickup2	878054.072	1314774.065	3986.247	
Stickup3	878240.968	1315040.804	3981.424	
Stickup4	878292.277	1315443.760	3975.482	

## Appendix C

### Photographic Log



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## Appendix C - Photographic Log

Army National Guard, Site  
Investigation for PFAS

Fort William Henry Harrison

Helena, Montana

### Photograph No. 01

**Date** 2/12/2019

**Time** 17:17

#### Description:

Collection of shallow soil samples from air knife location. Dedicated stainless steel ladle used to scrap soil from side of borehole from the required depth interval.

#### Orientation:

NA



### Photograph No. 02

**Date** 2/12/2019

**Time** 17:18

#### Description:



Stainless steel bowl with soil from air knife boring.

#### Orientation:

NA



## Appendix C - Photographic Log

Army National Guard, Site Investigation for PFAS	Fort William Henry Harrison	Helena, Montana
<p><b>Photograph No. 03</b></p> <p><b>Date</b> 2/12/2019  <b>Time</b> 13:10</p> <p><b>Description:</b>  Very cold weather and snowy roads. Parked near running path used to access drilling location for well installation at AOI1-MW1.</p> <p><b>Orientation:</b>  North</p>		
<p><b>Photograph No. 04</b></p> <p><b>Date</b> 2/13/2019  <b>Time</b> 11:55</p> <p><b>Description:</b>  LS250 MiniSonic drill rig positioned to drill boring AOI1-MW1.</p> <p><b>Orientation:</b>  Southeast</p>		



## Appendix C - Photographic Log

Army National Guard, Site  
Investigation for PFAS

Fort William Henry Harrison

Helena, Montana

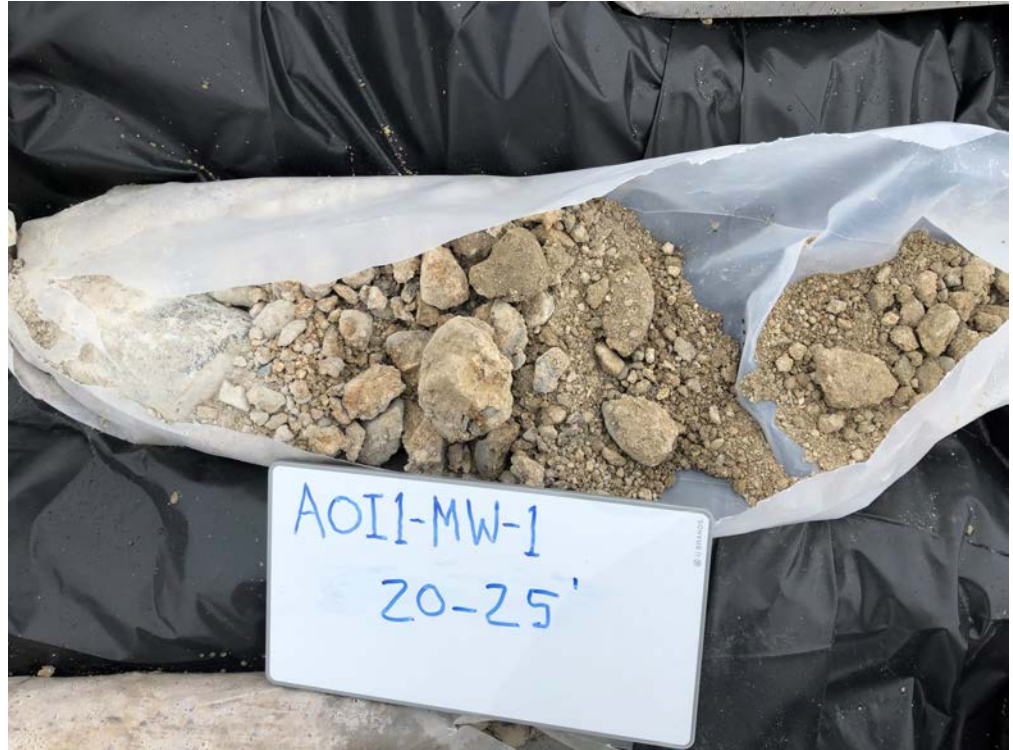
**Photograph No. 05**

**Date** 2/13/2019

**Time** 14:09

**Description:**

Soil core from AOI1-MW1  
(20-25 feet BGS).



**Orientation:**

NA

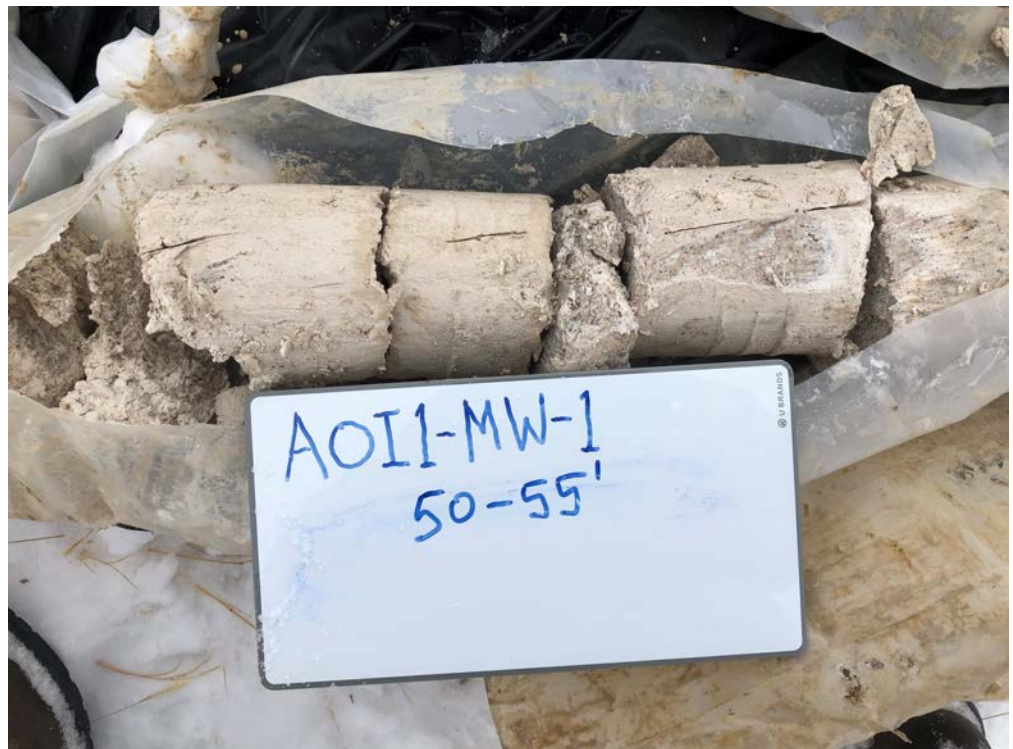
**Photograph No. 06**

**Date** 2/13/2019

**Time** 16:42

**Description:**

Soil core from AOI1-MW1  
(50-55 feet BGS).



**Orientation:**

NA



## Appendix C - Photographic Log

Army National Guard, Site Investigation for PFAS		Fort William Henry Harrison	Helena, Montana
<b>Photograph No. 07</b>			
<b>Date</b> 2/15/2019			
<b>Time</b> 10:56			
<b>Description:</b> Soil core from AOI1-MW2 (0-5 feet BGS).			
<b>Orientation:</b> NA			
<b>Photograph No. 08</b>			
<b>Date</b> 2/15/2019			
<b>Time</b> 11:01			
<b>Description:</b> Soil core from AOI1-MW2 (25-35 feet BGS).			
<b>Orientation:</b> NA			



## Appendix C - Photographic Log

Army National Guard, Site Investigation for PFAS	Fort William Henry Harrison	Helena, Montana
<p><b>Photograph No. 09</b></p> <p><b>Date</b> 2/15/2019 <b>Time</b> 11:02</p> <p><b>Description:</b> Soil core from AOI1-MW2 (30-35 feet BGS).</p> <p><b>Orientation:</b> NA</p>		
<p><b>Photograph No. 10</b></p> <p><b>Date</b> 2/16/2019 <b>Time</b> 9:27</p> <p><b>Description:</b> Completed stickup monitoring well AOI1-MW2.</p> <p><b>Orientation:</b> North</p>		

## Appendix C - Photographic Log

Army National Guard, Site Investigation for PFAS		Fort William Henry Harrison	Helena, Montana
<b>Photograph No. 11</b>			
<b>Date</b> 2/20/2019 <b>Time</b> 10:32			
<b>Description:</b> Soil core from AOI1-MW3 (5-10 feet BGS).			
<b>Orientation:</b> NA			
<b>Photograph No. 12</b>			
<b>Date</b> 2/20/2019 <b>Time</b> 10:42			
<b>Description:</b> Soil core from AOI1-MW3 (45-50 feet BGS).			
<b>Orientation:</b> NA			



## Appendix C - Photographic Log

Army National Guard, Site  
Investigation for PFAS

Fort William Henry Harrison

Helena, Montana

### Photograph No. 13

Date 5/21/2019

Time 9:21

#### Description:

Soil core from AOI2-MW1 (0-5 feet BGS).

#### Orientation:

NA



### Photograph No. 14

Date 5/21/2019

Time 10:26

#### Description:

Soil core from AOI2-MW1  
(30 feet BGS).

#### Orientation:

NA





## Appendix C - Photographic Log

Army National Guard, Site  
Investigation for PFAS

Fort William Henry Harrison

Helena, Montana

### Photograph No. 15

Date 5/23/2019

Time 9:32

#### Description:

Soil core from AOI2-MW2 (5  
feet BGS).

#### Orientation:

NA



### Photograph No. 16

Date 5/23/2019

Time 10:57

#### Description:

Soil core from AOI2-MW2  
(20-25 feet BGS).


#### Orientation:

NA





## Appendix C - Photographic Log

Army National Guard, Site Investigation for PFAS	Fort William Henry Harrison	Helena, Montana
<p><b>Photograph No. 17</b></p> <p><b>Date</b> 5/21/2019  <b>Time</b> 16:40</p> <p><b>Description:</b>  Soil core from AOI3-MW1  (10 feet BGS).</p> <p><b>Orientation:</b>  NA</p>		
<p><b>Photograph No. 18</b></p> <p><b>Date</b> 5/22/2019  <b>Time</b> 10:33</p> <p><b>Description:</b>  Soil core from AOI3-MW1  (50 feet BGS).</p> <p><b>Orientation:</b>  NA</p>		



## APPENDIX C – Photographic Log

Army National Guard, Preliminary Assessment for PFAS	Fort William Henry Harrison	Helena, Montana
<p><b>Photograph No. 19</b></p> <p><b>Description:</b></p> <p>Preclearing a boring location using an air knife and vac truck at Fire Training Area # 4 in AOI 2.</p>		
<p><b>Photograph No. 20</b></p> <p><b>Description:</b></p> <p>HSA rig set-up on AOI01-MW04.</p>		



## APPENDIX C – Photographic Log

Army National Guard, Preliminary Assessment for PFAS	Fort William Henry Harrison	Helena, Montana
<p><b>Photograph No. 21</b></p> <p><b>Description:</b></p> <p>Soil core from AOI01-06-SB, 05-07 ft bgs.</p>		
<p><b>Photograph No. 22</b></p> <p><b>Description:</b></p> <p>Soil core from AOI01-06-SB, 15-17 ft bgs.</p>		



## APPENDIX C – Photographic Log

Army National Guard, Preliminary Assessment for PFAS	Fort William Henry Harrison	Helena, Montana
<p><b>Photograph No. 23</b></p> <p><b>Description:</b></p> <p>Soil core from AOI01-06-SB, 20-22 ft bgs.</p>		
<p><b>Photograph No. 24</b></p> <p><b>Description:</b></p> <p>Soil core from AOI01-06-SB, 25-27 ft bgs.</p>		



## APPENDIX C – Photographic Log

Army National Guard, Preliminary Assessment for PFAS		Fort William Henry Harrison	Helena, Montana
<b>Photograph No. 25</b>			
<b>Description:</b> Soil core from AOI01-06-SB, 30-32 ft bgs.			
<b>Photograph No. 26</b>			
<b>Description:</b> Soil core from AOI01-06-SB, 35-37 ft bgs			



## APPENDIX C – Photographic Log

Army National Guard, Preliminary Assessment for PFAS		Fort William Henry Harrison	Helena, Montana
<b>Photograph No. 27</b>			
<b>Description:</b> Soil core from AOI03-MW2, 5-7 ft bgs.			
<b>Photograph No. 28</b>			
<b>Description:</b> Soil core from AOI03-MW2, 10-12 ft bgs.			



## APPENDIX C – Photographic Log

Army National Guard, Preliminary Assessment for PFAS		Fort William Henry Harrison	Helena, Montana
<b>Photograph No. 29</b>			
<b>Description:</b> Soil core from AOI03-MW2, 15-17 ft bgs.			
<b>Photograph No. 30</b>			
<b>Description:</b> Soil core from AOI03-MW2, 25-27 ft bgs.			





## APPENDIX C – Photographic Log

Army National Guard, Preliminary Assessment for PFAS		Fort William Henry Harrison	Helena, Montana
<b>Photograph No. 31</b>			
<b>Description:</b> Soil core from AOI03-MW2, 30-32 ft bgs.			
<b>Photograph No. 32</b>			
<b>Description:</b> Soil core from AOI03-MW2, 35-37 ft bgs.			



## APPENDIX C – Photographic Log

Army National Guard, Preliminary Assessment for PFAS		Fort William Henry Harrison	Helena, Montana
<b>Photograph No. 33</b>			
<b>Description:</b> Soil core from AOI03-MW2, 45-47 ft bgs.			
<b>Photograph No. 34</b>			
<b>Description:</b> Soil core from AOI03-MW2, 45-47 ft bgs.			





## APPENDIX C – Photographic Log

Army National Guard, Preliminary Assessment for PFAS	Fort William Henry Harrison	Helena, Montana
<p><b>Photograph No. 35</b></p> <p><b>Description:</b></p> <p>Soil core from AOI03-MW2, 50-52 ft bgs.</p>		
<p><b>Photograph No. 36</b></p> <p><b>Description:</b></p> <p>Soil core from AOI03-MW2, 50-52 ft bgs,</p>		



## APPENDIX C – Photographic Log

Army National Guard, Preliminary Assessment for PFAS	Fort William Henry Harrison	Helena, Montana
<p><b>Photograph No. 37</b></p> <p><b>Description:</b></p> <p>Soil core from AOI03-MW2, 55-57 ft bgs.</p>		
<p><b>Photograph No. 38</b></p> <p><b>Description:</b></p> <p>Well construction and pad at AOI03-MW02.</p>		

## **Appendix D**

### **TPP Meeting Minutes/Montana DEQ Memorandum**



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**Meeting Minutes**  
**Fort William Henry Harrison (FTWHH) – Site Inspection**  
**Technical Project Planning (TPP) – Meeting 1/2**  
**Preliminary Assessments and Site Inspections (PA/SIs) for Perfluorooctanesulfonic Acid**  
**(PFOS) and Perfluorooctanic Acid (PFOA) Impacted Sites**  
**Contract No.W912DR-12-D-0014, DO W912DR17F0192**  
**Thursday, 8 November 2018**  
**0900 to 1430**

<b>Participants</b>			
<b>Name</b>	<b>Affiliation*</b>	<b>Phone</b>	<b>E-Mail</b>
Bonnie Packer	ARNG IED	703-607-7977	<a href="mailto:bonnie.m.packer.ctr@mail.mil">bonnie.m.packer.ctr@mail.mil</a>
LTC Adel Johnson	MTARNG-ENV	406-324-3089	<a href="mailto:adel.m.johnson.mil@mail.mil">adel.m.johnson.mil@mail.mil</a>
MAJ Mike Talia	MTNG-Legal	406-324-3325	<a href="mailto:michael.p.talia.mil@mail.mil">michael.p.talia.mil@mail.mil</a>
MSgt Michael Touchette	MTARNG-PA	406-324-3009	<a href="mailto:michael.a.touchette2.mil@mail.mil">michael.a.touchette2.mil@mail.mil</a>
Scott Gestring	Montana DEQ	406-444-6471	<a href="mailto:sgestring@mt.gov">sgestring@mt.gov</a>
Rob Halla	ARNG IED	703-607-7995	<a href="mailto:walter.r.halla2.civ@mail.mil">walter.r.halla2.civ@mail.mil</a>
Wade M. Juntunen	MTARNG-ENV	402-324-3088	<a href="mailto:wade.m.juntunen.ctr@mail.mil">wade.m.juntunen.ctr@mail.mil</a>
Rebekah Myers	MTARNG-ENV	406-324-3087	<a href="mailto:rebekah.l.myers2.nfg@mail.mil">rebekah.l.myers2.nfg@mail.mil</a>
Virgil Kaiser	MTARNG-ENV	406-324-3085	<a href="mailto:virgil.b.kaiser.nfg@mail.mil">virgil.b.kaiser.nfg@mail.mil</a>
Jamey Thibodeau	VA Fire Department	406-447-7770	<a href="mailto:jamey.thibodeau@va.gov">jamey.thibodeau@va.gov</a>
Leslie Holz	VA Environmental	406-447-7121	<a href="mailto:leslie.holz2@va.gov">leslie.holz2@va.gov</a>
Steve Gragert	USACE-Omaha	402-995-2743	<a href="mailto:steve.p.gragert@usace.army.mil">steve.p.gragert@usace.army.mil</a>
Marc Anderson	USACE-Omaha	402-995-2285	<a href="mailto:marc.d.anderson@usace.army.mil">marc.d.anderson@usace.army.mil</a>
Jady Harrington	AECOM	402-952-2533	<a href="mailto:jacquelyn.harrington@aecom.com">jacquelyn.harrington@aecom.com</a>
Jennifer Zorinsky	AECOM	402-952-2563	<a href="mailto:jennifer.zorinsky@aecom.com">jennifer.zorinsky@aecom.com</a>

\*ARNG IED-Army National Guard Installations & Environment Division, Cleanup Branch; MTARNG-ENV-Montana Army National Guard-Environmental; MTNG-Montana National Guard; MTARNG-PA-MTARNG Public Affairs; Montana DEQ-Montana Department of Quality; VA-Veterans Administration; USACE-United States Army Corps of Engineers; and AECOM-AECOM Technical Services, Inc.

Bonnie Packer (ARNG IED) welcomed participants and began the meeting with a role call and introductions. The sign-in sheet is included as **Attachment A** to these meeting minutes. The meeting focused on perfluoroalkyl and polyfluoroalkyl substances (PFAS) releases at Fort William Henry Harrison and the proposed sampling approach.

Jady Harrington, Task Manager for AECOM, began the presentation, and the briefing slides are included here as **Attachment B**. Key points discussed during the presentation are provided below.

As a local safety reminder, slips, trips, and falls were covered due to the cold, snowy, and icy weather. The SI will conform to requirements in USACE Engineering Manual 385-1-1. Site-specific safety procedures will be planned for and followed during SI field work, including establishing controlled work zones during field activities. The site-specific Draft Accident Prevention Plan (APP) is awaiting USACE concurrence on response to comments. Steve Gragert (USACE) will follow-up with the USACE reviewers.

**Programmatic Discussion:**

- The TPP process is a USACE established process with the main goal of engaging stakeholders in project planning and reporting. The ARNG has embraced a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) model for the PFAS PA/SIs nationwide.

## **FINAL**

- The TPP2 meeting will provide an opportunity for stakeholders to discuss the SI Work Plan; regulatory stakeholders will be afforded the opportunity to formally review and comment on the SI Work Plan. Jady Harrington also indicated that the TPP1 would serve as the TPP2. Sample rational and locations would be presented later in the presentation. In addition, a visual reconnaissance of sample locations would be completed after the presentation for discussion/concurrence.
- The TPP3 meeting presents the SI Report findings to all stakeholders; again, regulatory review and comment of the document will occur.
- The ARNG PFAS program and is centrally contracted through USACE and managed by ARNG. Every ARNG facility nationwide responded to a questionnaire on potential PFAS releases. Facilities were prioritized by the likelihood of release and proximity to drinking water sources. FTWHH was identified as a high priority site, because residential wells were identified east of Williams Street.
- There are nearly 200 facilities on the ARNG's nationwide PA list.

### **Fort William Henry Harrison PA Findings:**

- Jennifer Zorinsky (AECOM) provided an overview of the PA findings. During the PA ten potential sources areas were identified and grouped into three AOIs. Four potential source areas were identified adjacent to FTWHH on VA property. PFAS releases were attributed to Firefighting Units (VA and 1049<sup>th</sup>) and the Prairie Dog Relocation Project. These locations are identified in the briefing slides, and more detail was provided for each potential source area and aqueous film forming foam (AFFF) use; a primary source of PFAS.
- Historical sampling results indicate PFAS detected in groundwater but below Health Advisory Levels (70 parts per trillion)

### **Fort William Henry Harrison SI Overview:**

- During the SI planning phase, data quality objectives (DQOs) will be established in order to collect the appropriate data to refine the conceptual site model (CSM).
- The primary goal of the SI is to determine the presence/ absence of a release from potential source areas.
- Geologic and hydrogeological data will be used to refine the CSM, specifically with respect to the direction and rate of groundwater flow. The ARNG PFAS program includes consideration of enhanced DQOs that assess PFAS at the boundary and from alternative sources.
- ARNG IED has initiated a future Remedial Investigation (RI) (if required), which will define the nature and extent of potential source areas and focus groundwater sampling at or near potential receptors.
- FTWHH SI Proposed Activities:
  - o Finalize Work Plan and Uniform Federal Policy-Quality Assurance Project Plan.
  - o Install permanent monitoring wells downgradient of potential source areas and at the facility boundary. Continuous soil cores to approximately 60 feet, soil samples collected at surface, mid-point, and above water table at new well locations. Continuous logging of borings will support understanding lithologic controls of preferential pathways.
  - o Sample existing monitoring wells adjacent to or near potential sources areas (BH-02, FH-02, MW-06, MW-07, MW-08, MW-10, OBTMW-01, and OBTMW-02). LTC Johnson (MTARNG-ENV) indicated existing monitoring wells at FTWHH were installed during the Operational Range Assessment completed in 2013 and for monitoring the burial trench, not specifically for PFAS.
  - o Bonnie Packer (ARNG-IED) noted the figures are missing groundwater and surface water flow directions.
  - o Surface soil (0-2 feet) and subsurface soil (2-4 feet) will be collected at the potential source areas.



## **FINAL**

- Surface soil (0-2 feet) will be collected in Mt. Defensa Avenue Drainage Ditch and Retaining Pond. One location was removed due to ditch improvements and excavation.
- Field activities are scheduled for the early spring.

### **Stakeholder Involvement:**

- Document Review and Distribution was determined as follows:
  - Montana DEQ and VA: one month turnaround time on document review
  - Montana DEQ requested one print and electronic copy of submitted documents.
  - VA requested one electronic copy of submitted documents.
- Bonnie Packer (ARNG-IED) discussed the need for stakeholder cooperation to expedite the SI fieldwork due to the presence of private, residential wells immediately downgradient of potential source areas.
- Montana DEQ will communicate directly with MTARNG. MTARNG will be responsible for relaying information to the remaining project stakeholders.

### **Questions and Open Discussion:**

- Bonnie Packer (ARNG-IED) indicated samples collected upgradient of the potential source areas at the VA and at the VA/FTWHH boundary will determine stakeholder contribution to confirmed presence of PFAS.
- Scott Gestring (Montana DEQ) had several questions regarding sample placement and requested the monitoring well (MW) location associated with the Excavated Soil from Mt. Defensa Ave Drainage Ditch be relocated close to the source area.
- Leslie Holz (VA Environmental) indicated that the VA irrigation well was on FTWHH and groundwater from the post was used on the VA property. During the discussion it was noted that the VA irrigation well was directly downgradient of the Burial Trench. Ms. Holz will coordinate with Rebekah Myers (MTARNG-ENV) to gain access to the pump house. The stakeholders agreed that the VA irrigation well should be added as a sampling location during the SI.
- There was an open discussion on adding additional existing MWs on FTWHH, but no additional wells were identified. MTARNG did indicate the OBTMW-02, located near the Burial Trench (AOI 3), has been historically dry.
- MAJ Mike Talia (MTNG-Legal) requested the SI be designed in anticipation of changing regulations in order to avoid repeating the work in the future.
- Stakeholders discussed the potential for an RI and the delineation of potential adjacent source areas on the VA property. MTARNG will coordinate with the VA to gain approval for sampling and well installation (if required).

### **Visual Reconnaissance:**

- Proposed MW and soil sample locations were visually inspected to ensure proper placement to confirm presence or absence of PFAS.
- The proposed MW location at the southwestern boundary was relocated to directly behind the FTWHH sign. LTC Johnson requested that the MW be flush mount.
- One surface soil location near the middle of the Mt. Defensa Avenue Drainage Ditch was removed due to ditch improvements and excavation.
- The proposed air knife location at the southern Prairie Dog Relocation potential source area was removed because the area has been reconfigured and revegetated, and the exact location of the foam injection is unknown.
- The surface/subsurface soil location associated with the Building 1010 was relocated and changed to a new MW location.
- The proposed MW location at the VA boundary was relocated to capture the conveyance of three upgradient over land surface water/snow melt flow patterns.

## **FINAL**

- Four additional surface/subsurface soil locations were added to the Excavated Soil from Mt. Defensa Ave Drainage Ditch potential source area.
- The proposed MW location at the southeastern boundary was relocated closer to the Excavated Soil from Mt. Defensa Ave Drainage Ditch potential source area.
- Proposed sampling of the existing monitoring well OBTMW-02 was removed because MTARNG indicated the well is historically dry and has never been sampled.

The meeting ended at 1430.

### **Action Items:**

- Leslie Holz will coordinate access to the VA irrigation well.
- Steve Gragert (USACE) will follow-up with the USACE reviewers regarding approval of the response to comments on the Draft APP.
- Based on sample location refinement, AECOM will revise the applicable worksheets and figures in the Work Plan and submit to the stakeholders for review and concurrence.

**FINAL**

**Attachment A-** TPP1 Sign-In Sheet



**SIGN-IN SHEET**  
**Technical Project Planning Meeting 1**  
**Site Inspection, Fort William Henry Harrison, Helena, Montana**  
**Thursday 8 November 2018**

Name	Organization/Role	Phone	Email
Marc Anderson	USACE Omaha Dist	(402) 995-2285	marc.d.anderson@usace.army.mil
Bonnie Packer	ARNG IED - PM	703-607-7977	bonnie.m.packer.ctr@mail.mil
Adel Johnson	MTARNG - ENV	<sup>324-3089</sup> 406-431-457	adel.m.johnson.mil@mail.mil
MIKE TALIA	MTNG - LEGAL	406-324-3325	michael.p.talia.mil@mail.mil
Scott Gestring	DEQ / PM	406 444-6471	sgestring@mt.gov
Steve Gragert	USACE - Omaha	402-995-2743	steve.p.gragert@usace.army.mil
Wade M. Juntunen	MTARNG - ENV	406-324-3088	wade.m.juntunen.ctr@mail.mil
Rob HALLA	ARNG - D	703-607-7995	WALTER.R.HALLA2.CIV@MAIL.MIL
Virgil Kaiser	MTARNG - ENV	406 324-3085	Virgil.B.Kaiser.nfg@mail.mil
Michael Touchette	MTARNG - Public Affairs	(406) 324-3009	michael.a.touchette2.mil@mail.mil
Jamey Thibodeau	VA - Fire Department	(406) 447-7770	jamey.thibodeau@va.gov
Leslie Holz	VA Environmental	406 447-7121	leslie.holz@va.gov
Rebekah Myers	MTARNG - ENV	406-324-3087	rebekah.l.myers2.nfg@mail.mil

**FINAL**

**Attachment B-** TPP1 Briefing Slides



# **Fort William Henry Harrison - Site Inspection Montana Army National Guard**

## **Technical Project Planning (TPP) Meeting 1**

**Preliminary Assessments and Site Inspections  
(PA/SI) for Perfluorooctanesulfonic Acid (PFOS) and  
Perfluorooctanoic Acid (PFOA) Impacted Sites**

**8 November 2018**





# Agenda

- Introductions
- Safety Moment
- TPP Meeting Goals
- Army National Guard (ARNG) PA/SI Overview
- ARNG PA Results
- Fort William Henry Harrison (FTWHH) SI Overview
- Stakeholder Involvement
- Questions and Open Discussion
  - Sample Location Refinement



# Introductions

- ARNG-Installation and Environment Division (IED), Cleanup Branch
  - Bonnie Packer, Nationwide Project Manager
  - Captain Pam Hess, Toxic Release Program Manager
- United States Army Corps of Engineers (USACE)
  - Steve Gragert, Project Manager
- Montana Army National Guard (MTARNG)
  - LTC Adel Johnson, Environmental Program Manager
  - Wade Juntunen, Project Manager
- Veterans Administration
  - Leslie Holz, GEMS Program Manager Montana VA Health Care System
  - George Setlock, Environmental Program Manager (VHA GEMS Program)
- Montana Department of Environmental Quality (DEQ)
  - Scott Gestring, DSMOA Project Officer, DEQ Cleanup, Protection and Redevelopment Section
  - Katie Morris, Risk Assessor, Cleanup, Protection, & Redevelopment Section Waste Management & Remediation Division Missoula Office
- AECOM Technical Services, Inc.
  - Jady Harrington, Project Manager
  - Jennifer Zorinsky, SI Task Manager



# Safety Moment

## Site Safety Procedures

- SI will follow USACE Engineering Manual (EM) 385-1-1 requirements:
  - Accident Prevention Plan addresses all component plans for EM 385-1-1, including Construction Support during drilling operations
  - Site Specific Health and Safety Plan addresses project participants, training, and hazard identification and mitigation
- Planning documents were prepared during SI Work Plan phase





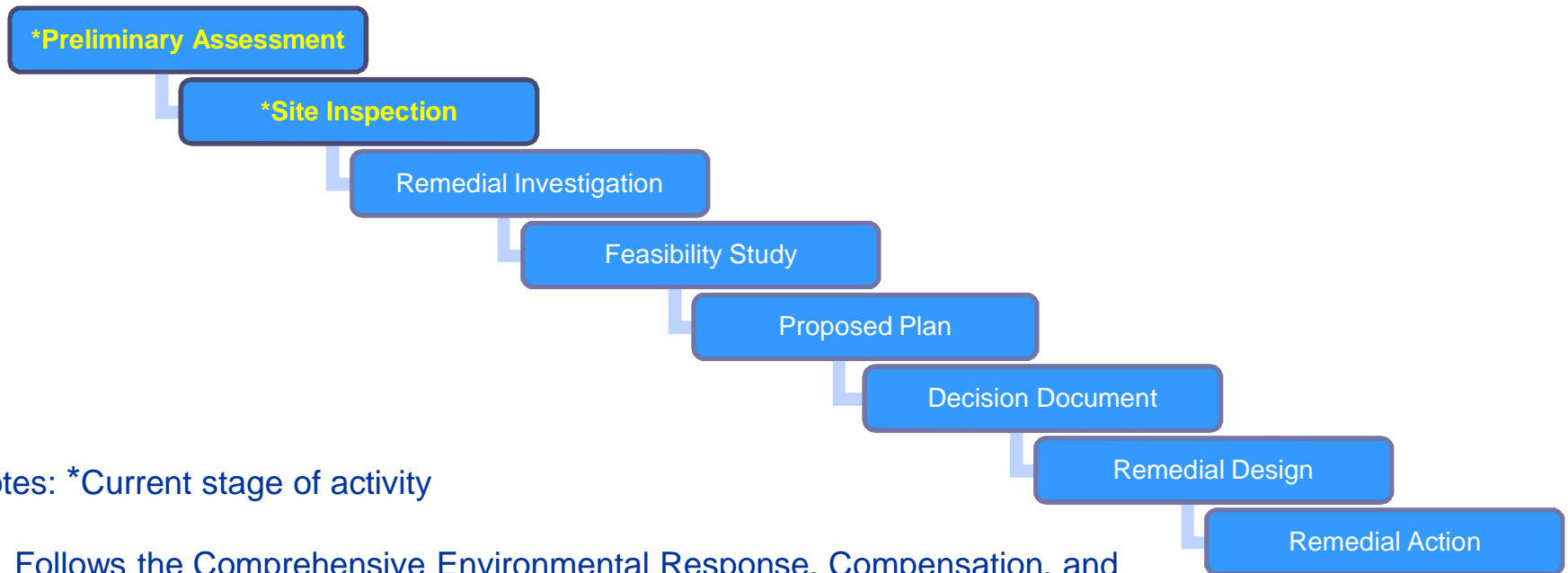
# TPP Meeting Goals

- TPP1:
  - Provide an overview of the ARNG PA/SI Program
  - Define objectives for SI data collection
  - Encourage stakeholder involvement
  - Review project schedule
  - Capture action items
- TPP2: Discuss proposed SI approach
- TPP3: Discuss SI findings
- Participants:
  - TPP1 and 2: ARNG, USACE, Montana DEQ
  - TPP3: ARNG, USACE, Montana DEQ, other local stakeholders



# ARNG PA/SI Overview

## Work Phases



Notes: \*Current stage of activity

- Follows the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Process
- An interim removal action can be conducted or a No Further Action determination can be made at any phase
- Restoration Advisory Board is typically solicited at Remedial Investigation/Feasibility Study Phase



# ARNG PA/SI Overview

- Activities centrally contracted through USACE and managed by ARNG-IED
  - USACE Baltimore manages the contract, with technical project support from Omaha and Sacramento Districts
  - Project support: chemistry, geology, risk screening
- PA ranking (~200 facilities) - state ARNG input
  - Likelihood of release
  - Complete pathway to drinking water receptor
- Priority assigned to facilities with highest likelihood of release near drinking water intake
- PA – facility-wide; SI – areas of interest (AOIs)





# ARNG PA/SI Overview

- ARNG / MTARNG
  - Identify potential per- and polyfluorinated alkyl substances (PFAS) release locations
  - Provide facility access and points of contact
  - Gather and provide appropriate documents
  - Identify/schedule personnel to interview
  - Supply final PA to the regulatory agencies
- SI Regulatory Involvement
  - CERCLA SI conducted in conjunction with the appropriate regulatory agency

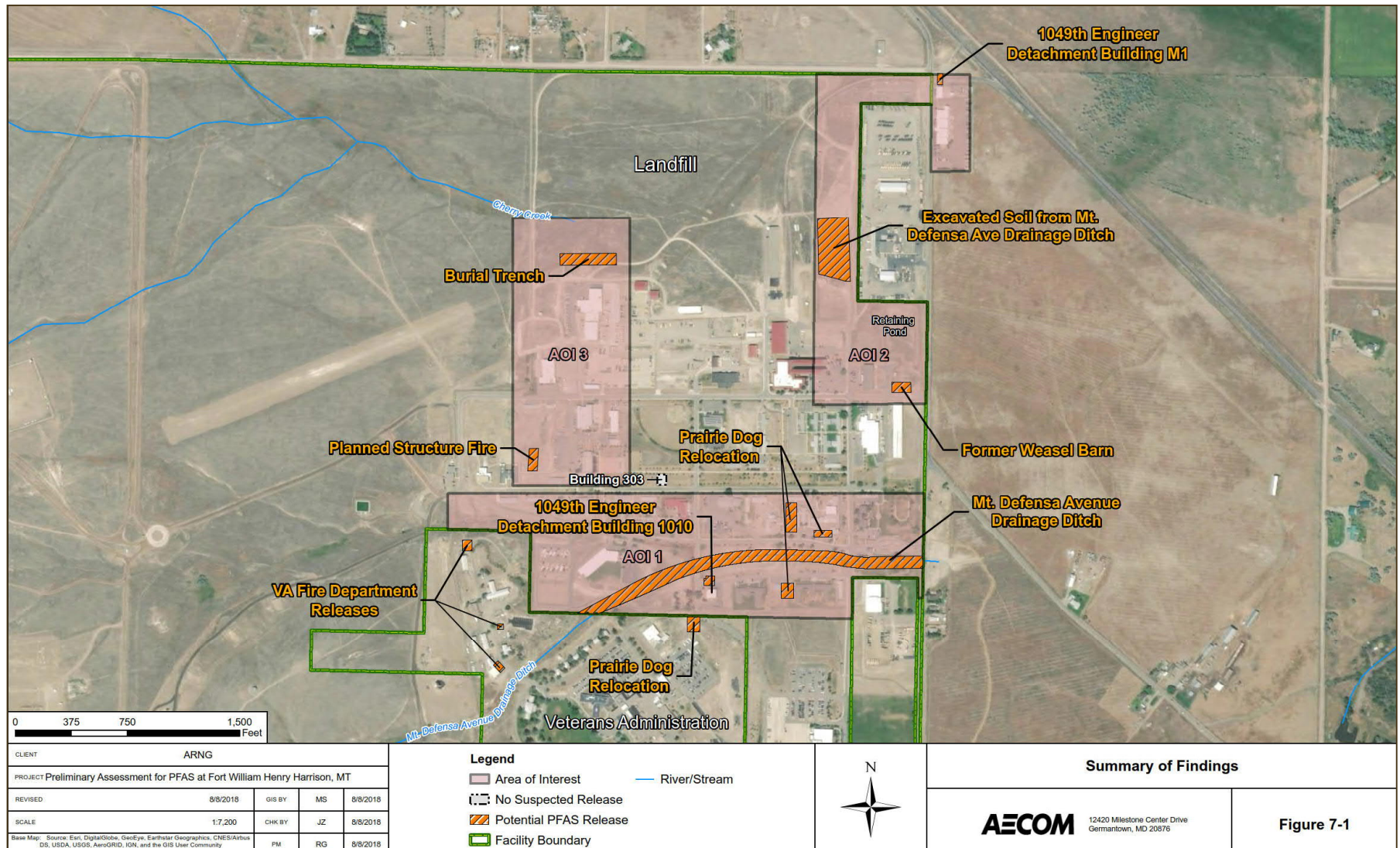


# ARNG PA Results

- Potential Source Areas: 10 identified during the PA
- The potential source areas were grouped into 3 AOIs
- Adjacent Source Areas: 4 identified adjacent to FTWHH
- PFAS releases attributed to Firefighting Units (Veterans Administration and 1049<sup>th</sup>) and Prairie Dog Relocation Project
- Historical sampling results indicate PFAS detected in groundwater but below Health Advisory Levels (70 parts per trillion)



# ARNG PA Results







# FTWHH SI Overview

## Data Quality Objectives (DQOs)

- Primary SI DQOs
  - Confirm the presence/absence of a release
  - Gather data for conceptual site model:  
Understanding of Source-Pathway-Receptor relationships  
required for establishing sampling strategy
- Extended SI DQOs
  - Determine the presence/absence at facility boundary
  - Check for alternate sources, up- or downgradient
  - Measure PFAS at/near receptor, if warranted



# FTWHH SI Overview

## Planning and Sampling

- Finalize Work Plan and Uniform Federal Policy-Quality Assurance Project Plan (UFP-QAPP)
- Install permanent monitoring wells downgradient of potential source areas and/or at the facility boundary
- Continuous soil cores to target depth (soil samples collected at surface, mid point, above water table for new well locations)
- Sample existing monitoring wells adjacent to potential sources areas (BH-02, FH-02, MW-06, MW-07, MW-08, MW-10, OBTMW-01, and OBTMW-02)
- Collect surface soil (0-2 feet) and subsurface soil (2-4 feet) at the potential source areas
- Collect surface soil (0-2 feet) in Mt. Defensa Avenue Drainage Ditch and Retaining Pond



# FTWHH SI Overview

## Analytical Parameters

Perfluorooctanesulfonic acid (PFOS)	Perfluoroheptanoic acid (PFHpA)
Perfluorohexanesulfonic acid (PFHxS)	Perfluorononanoic acid (PFNA)
Perfluorooctanoic acid (PFOA)	Perfluorobutanesulfonic acid (PFBS)
Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPA)
N-ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	N-methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)
Perfluorodecanoic acid (PFDA)	Perfluorotetradecanoic acid (PFTA)
Perfluorododecanoic acid (PFDoA)	Perfluorohexanoic acid (PFHxA)
Perfluorotridecanoic acid (PFTrDA)	Perfluoroundecanoic acid (PFUnA)
6:2 Fluorotelomer sulfonate (6:2 FTS)	8:2 Fluorotelomer sulfonate (8:2 FTS)

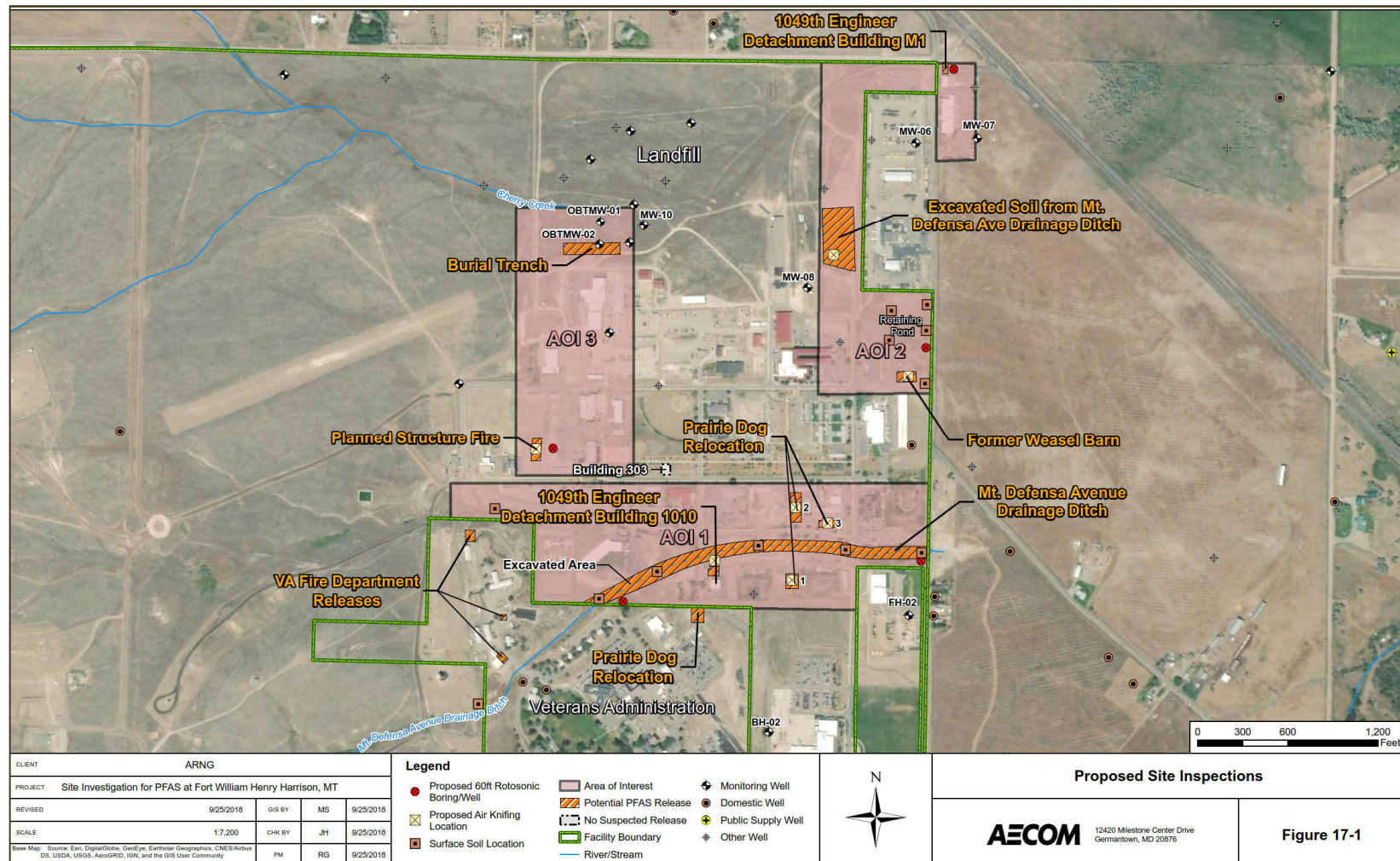
- All data will undergo Level IV data validation





# FTWHH SI Overview

## Proposed Sampling Locations





# FTWHH SI Overview

AOI	Potential Source Area	# of Boring Locations	Target Depth (feet)	Soil Samples	Groundwater Samples
1	Mt. Defensa Avenue Drainage Ditch	2	40-60	6	2
1	Mt. Defensa Avenue Drainage Ditch	Surface	0-2	5	--
1	Prairie Dog Relocations (1, 2, 3)	3	0-2 / 2-4	6	--
1	Building 1010	1	0-2 / 2-4	6	--
2	Cantonment Area Northeast	1	40-60	3	1
2	Cantonment Area Northeast	Surface	0-2	5	--
2	Excavated Soil from Mt. Defensa Ave Drainage Ditch	1	0-2 / 2-4	2	0
2	Former Weasel Barn	1	0-2 / 2-4	2	0
2	Building M1	1	40-60	3	1
3	Planned Structure Fire	1	40-60	3	1
3	Planned Structure Fire	1	0-2 / 2-4	2	--
All	Existing Monitoring Well Locations	--	--	--	8



# Stakeholder Involvement

- Use TPPs and open communication to encourage involvement
- Key involvement topics
  - Proposed approaches
  - Document review time for Montana DEQ and other stakeholders
- Schedule:
  - TPP2: November 2018
  - UFP-QAPP: Draft-Final for regulatory review in October 2018
  - Field Investigation: Winter 2018





# Questions and Open Discussion

- Coordination
  - Data transfer
  - Report distribution (paper, electronic, portable document format)
  - Stakeholder relations
- Schedule
- PA findings



# Sample Location Refinement

- Visual reconnaissance of sample locations
- Confirm placement is accessible and will meet DQOs
- Confirm existing monitoring well locations
- Relocate if required, with ARNG, MTARNG, and Montana DEQ concurrence



# Acronyms

- AOI – areas of interest
- ARNG – Army National Guard
- CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act
- DEQ –Department of Environmental Quality
- DQO – Data Quality Objective
- EM – Engineering Manual
- FTWHH – Fort William Henry Harrison
- IED – Installation and Environment Division
- MTARNG – Montana ARNG
- PA – Preliminary Assessment
- PFAS - Per- and Polyfluorinated Alkyl Substances
- PFOS – Perfluorooctanesulfonic Acid
- PFOA – Perfluorooctanoic Acid
- SI – Site Inspection
- TPP – Technical Project Planning
- UFP-QAPP – Uniform Federal Policy-Quality Assurance Project Plan
- USACE – United States Army Corps of Engineers



**Meeting Minutes**  
**Fort William Henry Harrison – Site Inspection (SI)**  
**Technical Project Planning (TPP) – Meeting 3**  
**Preliminary Assessments and Site Inspections (PA/SIs) for Perfluorooctanesulfonic Acid (PFOS)**  
**and Perfluorooctanoic Acid (PFOA) Impacted Sites**  
**Contract No. W912DR-12-D-0014, DO W912DR17F0192**  
**Friday, 23 July 2021**  
**1100-1130 EST**

Participants			
Name	Affiliation*	Phone	E-Mail
Mark Leeper	ARNG G9	804-516-3529	<a href="mailto:mark.s.leeper.civ@mail.mil">mark.s.leeper.civ@mail.mil</a>
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Kristin Addis	USACE	NA	<a href="mailto:kristin.l.addis@usace.army.mil">kristin.l.addis@usace.army.mil</a>
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\*ARNG G9 – Army National Guard; MTARNG – Montana Army National Guard; MDEQ – Montana Department of Environmental Quality; USACE – United States Army Corps of Engineers

Ms. Jady Harrington (AECOM) welcomed participants and reviewed the purpose of the meeting, outlined the agenda, and led a roundtable of introductions for everyone on the Technical Project Planning (TPP) 3 meeting. The meeting purpose was to discuss the Army National Guard (ARNG) Per- and Polyfluoroalkyl Substance (PFAS) Preliminary Assessment (PA)/Site Inspection (SI) program and the results of the SI for PFAS at Fort William Henry Harrison (FTWHH), Helena, Montana.

Briefing slides are included as **Attachment A**. Key points discussed during the presentation are provided below. Additionally, a safety moment was included that discussed safety procedures as we emerge from the pandemic and begin to return to normalcy.

**Programmatic Discussion (Slides 5-7):**

- The meeting goals for the TPP meetings included in the ARNG PFAS program were presented.
  - o The combined TPP 1 and 2 provided an overview of the ARNG PA/SI program, reviewed the PA findings, and discussed the approach of the SI at FTWHH.
  - o TPP 3 presented the SI results, resolved comments/concerns to gain concurrence on the SI Report, and discussed future actions at the Site.
- The program follows the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) progress. The CERCLA process was reviewed, and a CERCLA status overview of the site was provided:
  - o The Final PA Report for FTWHH was issued in August 2018.
  - o The SI fieldwork was completed in October 2020.
  - o The Draft Final SI Report was transmitted to the Montana Department of Environmental Quality (MDEQ) in April 2021.

**PA Summary of Findings (Slides 8-11):**

- A brief overview of the PA findings were presented. During the PA, fourteen potential release areas were identified and grouped into three Areas of Interest (AOI). The identified release areas included:
  - o AOI 1
    - Black-tailed Prairie Dog Relocation
    - MTARNG 1049<sup>th</sup> Engineer Detachment (Building 1010)
    - Mt. Defense Avenue Drainage Ditch
    - MTARNG 1049<sup>th</sup> Firefighting Training Area 1 and 3
  - o AOI 2

- Excavated soil from Mt. Defense Avenue Drainage Ditch
    - Former Weasel Barn
    - MTARNG 1049<sup>th</sup> Engineer Detachment (Building M1)
    - MTARNG 1049<sup>th</sup> Firefighting Training Area 4
  - AOI 3
    - Planned Structure Fire
    - Burial Trench
    - MTARNG 1049<sup>th</sup> Firefighting Training Area 2
  - Potential Adjacent Sources
    - VA Fire Department releases (three locations)
- The potential PFAS release areas were attributed to aqueous fire forming foam (AFFF) releases from fire training activities, firetruck washing, emergency response, and pest control.

**SI Data Quality Objectives and Screening Levels (Slides 12-13):**

- The primary data quality objectives (DQOs) established for the SI included confirming the presence or absence of a release at the potential PFAS release areas, as well as gathering data to refine the CSM.
  - Enhanced DQOs for the SI included determining the presence/absence of PFAS at the facility boundary, checking for alternate sources, and measuring PFAS at/near receptors, if warranted.
- The Department of Defense (DoD) has adopted a policy to retain facilities in the CERCLA process based on risk-based screening levels (SLs) for soil and groundwater. Programmatically, the SLs used were established in a memorandum from the Office of the Secretary of Defense (OSD), dated 15 October 2019, and apply to three compounds: PFOA, PFOS, and perfluorobutane sulfonic acid (PFBS). The SLs were calculated using the United States Environmental Protection Agency (USEPA) Office of Superfund Sites On-Line Calculator, which was updated on 8 April 2021 based on the release of the final Human Health Toxicity Values for PFBS (USEPA, 2021).
  - If the maximum concentration for sampled media were to exceed the SLs established in the OSD memorandum, the AOI would proceed to the next phase under CERCLA, which is the Remedial Investigation (RI).
  - Ms. Harrington clarified that the PFBS SLs were recently updated due to new toxicity values from the USEPA; however, the new PFBS SLs were not incorporated into the FTWHH SI Report because all results were below the new levels, and the updated SLs would not change the outcome of the report.

**SI Summary of Approach (Slides 14-16):**

- Fieldwork included the installation of permanent monitoring wells using sonic drilling technology/hollow stem auger and groundwater samples.
- Soil samples were collected from each boring location at the surface, above the water table, and at the mid-point between.
- Surface soil samples (hand auger) were collected at each AOI to supplement the soil samples collected from the sonic borings.
- During Mobilization 1, 47 soil samples were collected from 27 locations (soil boring or hand auger), 15 groundwater samples were collected from six new monitoring wells, eight existing monitoring wells, and one irrigation well.
- During Mobilization 2, 30 soil samples were collected from 27 boring locations (soil boring or hand auger), 15 groundwater samples were collected from five new monitoring wells and ten existing monitoring wells.

**SI Summary of Findings (Slides 17-38):**

- In the soil samples, PFOA, PFOS, and PFBS were detected at all three AOIs, but the detections were below the SLs. The highest concentrations were found in surface soil samples at AOI 1.
  - The maximum concentration of PFOA in soil was 0.473 J microgram per kilogram (µg/kg), which was collected from 0-2 feet bgs at AOI03-MW01. The maximum detection of PFOS in soil was 39.9 J ug/kg, which was collected from 0-2 feet bgs at AOI1-SS11.

## **FINAL**

- In groundwater, PFOA and PFBS were detected; however, the detections were all below the SLs. PFOS was detected above the SLs and had a maximum concentration of 118 ng/L.
- Potable well samples were collected from five nearby locations in close proximity to the facility boundary; no detections exceeded the 70 ng/L USEPA Health Advisory (HA).
- The revised CSM figure was presented for the AOIs. The sources of the releases are from fire training activities, fire truck washing, prairie dog relocation, and structural fires. Through human activities, precipitation and runoff, or leaching and infiltration, the exposure pathways may be potentially complete for the following:
  - o The inhalation of dust by site workers, construction workers, and trespassers or recreational users, and off-facility residents.
  - o Ingestion of surface soil by site workers, construction workers, and trespassers or recreational users.
  - o The ingestion of subsurface soil by construction workers.
  - o The potential ingestion of downgradient groundwater by off-facility residents.

### **Next Steps (Slide 39):**

- Based on the results of the SI, FTWHH is recommended for RI.

### **Open Discussion (Slide 40):**

- Ms. Harrington indicated that the MDEQ letter of concurrence (which had been received prior to the TPP 3 meeting) would be included in the TPP Meeting Minutes Appendix in the SI Report.
- LTC Adel Johnson (MTARNG) updated the team on the status of the Rights-of-Entry (ROEs) for potable well sampling. There is 1 in process and two more pending. Approximately six or seven of the 16 sent out have been received. The next step will be to send out letters again.
- Mr. Scott Gestring (MDEQ) indicated he was interested to know what may have caused the increase in concentration at AOI01-MW03 between the two mobilizations. Ms. Harrington stated that the RI will provide additional data for comparison and trends which might shed more light on this increase.
- LTC Johnson informed the team that MDEQ would be collecting surface water samples from Sevenmile Creek, specifically because of the former waste water lagoons that serviced FTWHH and the Veterans Administration Hospital. Mr. Gestring asked if there would be co-located sediment samples collected as well. LTC Johnson thought it was surface water only, but wasn't entirely sure. Ms. Briana Niestrom (USACE) added that the sampling locations are on VA property and therefore are out of the control of USACE for ROE purposes.

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**Attachment A – TPP 3 Briefing Slides**



**Fort William Henry Harrison  
Site Inspection  
Montana Army National Guard (MTARNG)**

**Technical Project Planning (TPP) Meeting 3**

**Preliminary Assessments and Site Inspections (PA/SI)  
for Perfluorooctanesulfonic Acid (PFOS) and  
Perfluorooctanoic Acid (PFOA) Impacted Sites**

**23 July 2021**



# Agenda

- Introductions
- Safety Moment
- TPP Meeting Goals
- Army National Guard (ARNG) Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Process Overview
- PA Overview
- SI Results
- Next Steps
- Questions and Open Discussion



# Introductions

## **ARNG G9**

- Dave Connolly, per- and polyfluoroalkyl substances (PFAS) Program Manager
- Bonnie Packer, Nationwide Project Manager
- Mark Leeper, ARNG Project Manager

## **United States Army Corps of Engineers (USACE)**

- Tim Peck, Nationwide Program Manager, Baltimore District
- Briana Niestrom, Project Manager, Seattle District

## **MTARNG**

- Lieutenant Colonel Adel Johnson, Environmental Program Chief
- Wade Juntunen, Remediation Project Manager

## **Montana Department of Environmental Quality (Montana DEQ)**

- Scott Gestring, DSMOA Project Officer, Cleanup, Protection, and Redevelopment Section

## **AECOM Technical Services, Inc.**

- Jacquelyn Harrington, SI Senior Lead
- Andrew Borden, SI Task Manager





# Safety Moment

## Returning to Normalcy

- Driving long distances/  
commuting
- Daily routines
- Summer vacations and  
sightseeing activities





# Meeting Goals

## **TPP 1/2 Review**

- Provided an overview of ARNG PA/SI Program
- Defined objectives for SI data collection
- Encouraged stakeholder involvement
- Reviewed project schedule
- Captured action items
- Discussed proposed SI approach

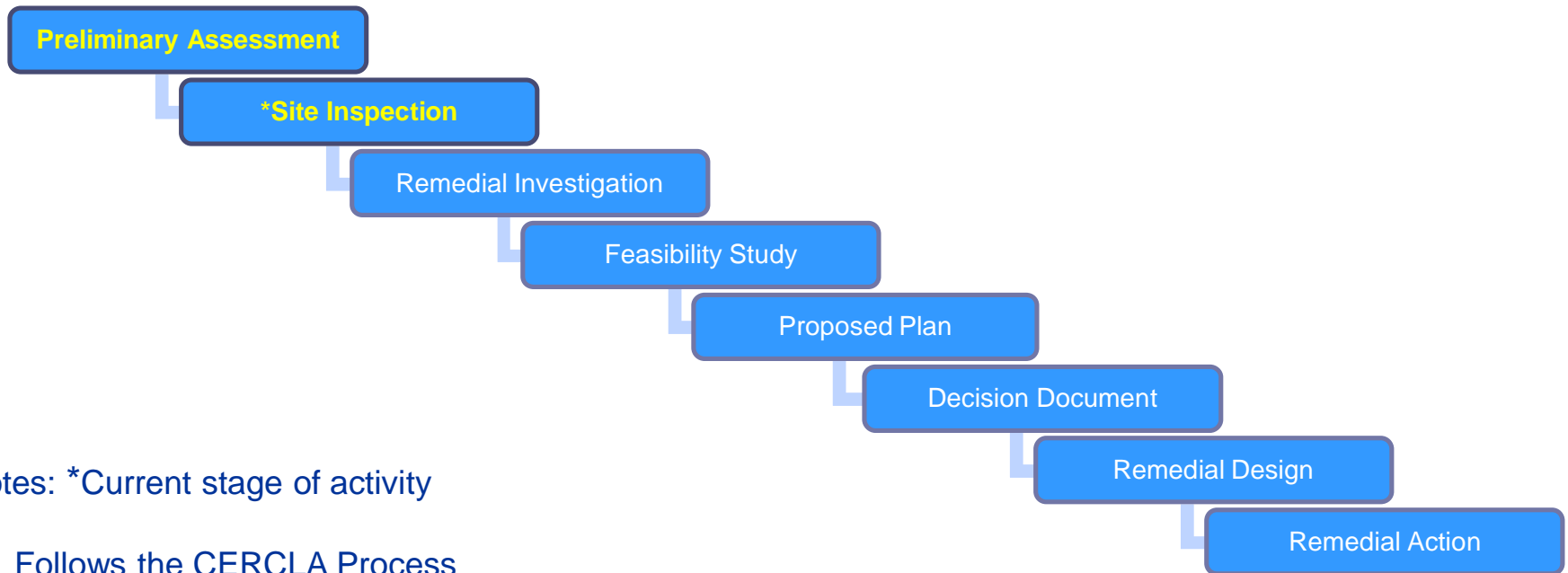
## **TPP 3**

- ARNG CERCLA program overview
- Revisit the PA findings
- Present SI Results and revise conceptual site model (CSM)
- Resolve comments/concerns and gain concurrence on presentation of findings in Draft Final SI Report
- Discuss future actions at the site



# ARNG PA/SI Overview

## Work Phases



Notes: \*Current stage of activity

- Follows the CERCLA Process
- An interim removal action can be conducted or a No Further Action determination can be made at any phase



# ARNG CERCLA Status Overview

- PA Report for Fort William Henry Harrison was completed by ARNG in August 2018
- SI fieldwork completed in October 2020
- Draft Final SI Report provided to Montana DEQ on 16 April 2021; results presented today





# PA – Summary of Findings

- Potential Release Areas: 14 identified during the PA and SI grouped into 3 areas of Interest (AOIs)
- PFAS releases attributed to aqueous film forming foam (AFFF) releases from fire training activities, firetruck washing, emergency response, and pest control



# PA – Summary of Findings

- AOI 1
  - Black-Tailed Prairie Dog Relocation
  - MTARNG 1049th Engineer Detachment (Building 1010)
  - Mt. Defensa Avenue Drainage Ditch
  - MTARNG 1049th Firefighting Training Area 1 and 3
- AOI 2
  - Excavated Soil from Mt. Defensa Avenue Drainage Ditch
  - Former Weasel Barn
  - MTARNG 1049th Engineer Detachment (Building M1)
  - MTARNG 1049th Firefighting Training Area 4

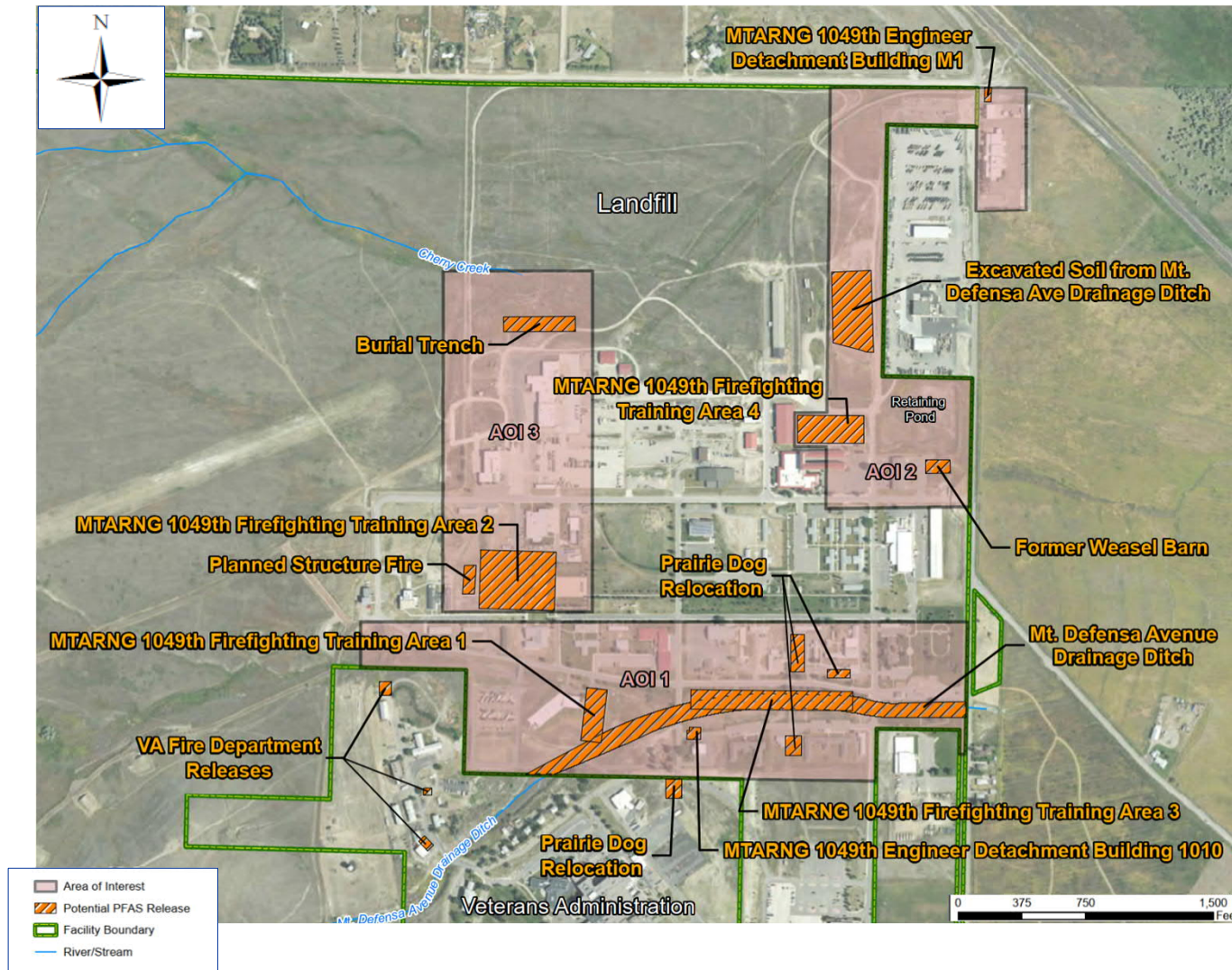


# PA – Summary of Findings

- AOI 3
  - Planned Fire Structure
  - Burial Trench
  - MTARNG 1049th Firefighting Training Area 2
- Potential Adjacent Sources
  - VA Fire Department releases (three locations)



# PA – Summary of Findings







# SI – Data Quality Objectives (DQOs)

- Primary SI DQOs
  - Confirm the presence / absence of a release at a potential source area
  - Gather data for refinement of CSM:
    - Source-Pathway-Receptor relationships
- Enhanced SI DQOs
  - Determine the presence/absence at the facility boundary
  - Check for alternate sources, up- or downgradient



# SI – Summary of Approach

- Data compared to Office of the Secretary of Defense (OSD) Screening Levels (SLs) for soil and groundwater
  - Memorandum from the OSD dated 15 October 2019
  - OSD SLs adopted for ARNG PFAS program
- Sites exceeding OSD SLs will proceed to the next phase under CERCLA (i.e., Remedial Investigation [RI])
  - Soil from 0-2 feet compared to Residential SL, 2-15 feet compared to Industrial SL, >15 feet not compared to either SL

Analyte	Residential (Soil) (µg/kg) <sup>a</sup> 0-2 feet bgs	Industrial/ Commercial Composite Worker (Soil) (µg/kg) <sup>a</sup> 2-15 feet bgs	Tap Water (Groundwater) (ng/L) <sup>a</sup>
<b>PFOA</b>	130	1,600	40
<b>PFOS</b>	130	1,600	40
<b>PFBS</b>	130,000	1,600,000	40,000

**Notes:**

a.) Assistant Secretary of Defense, 2019. Risk Based Screening Levels Calculated for PFOS, PFOA, PFBS in Groundwater and Soil using United States Environmental Protection Agency's (USEPA's) Regional Screening Level Calculator. HQ=0.1. 15 October 2019.



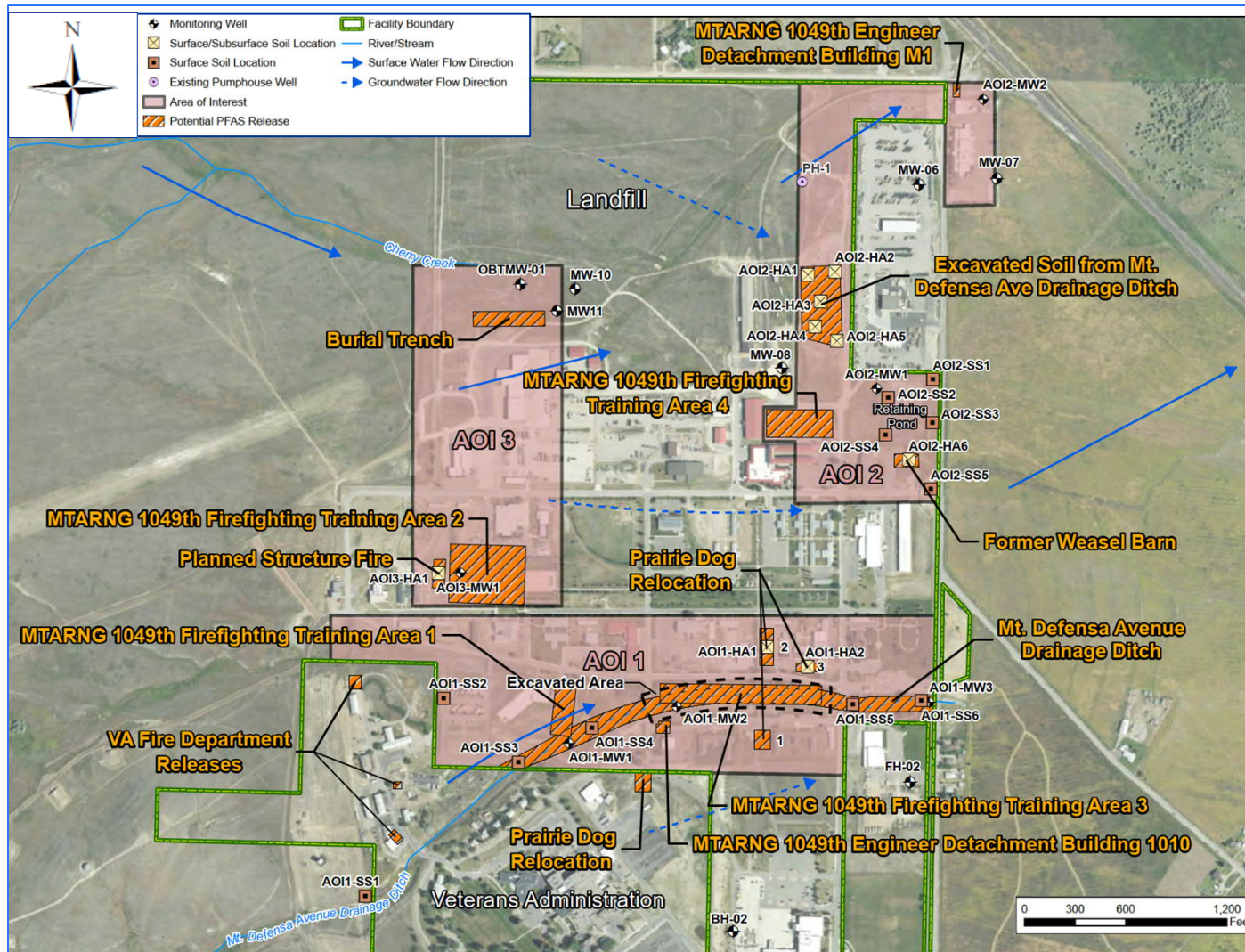
# SI – Summary of Approach

- Approach
  - Soil samples collected from each boring location: surface (0 to 2 feet below ground surface [bgs]), intermediate (15-30 feet bgs), and deep (35-48 feet bgs)
  - Permanent monitoring wells installed for groundwater samples (wells screened between 15 to 53 ft bgs)
- Total Samples
  - Mobilization 1 –
    - 47 soil grab samples from 27 boring locations; and
    - 15 groundwater samples, six from new monitoring well locations, eight from existing monitoring well locations, and one from an irrigation well location.
  - Mobilization 2 –
    - 30 soil grab samples from 27 boring locations; and
    - 15 groundwater samples, five from new monitoring well locations and ten from existing monitoring well locations.



# SI – Summary of Approach

## SI Locations – Mobilization 1

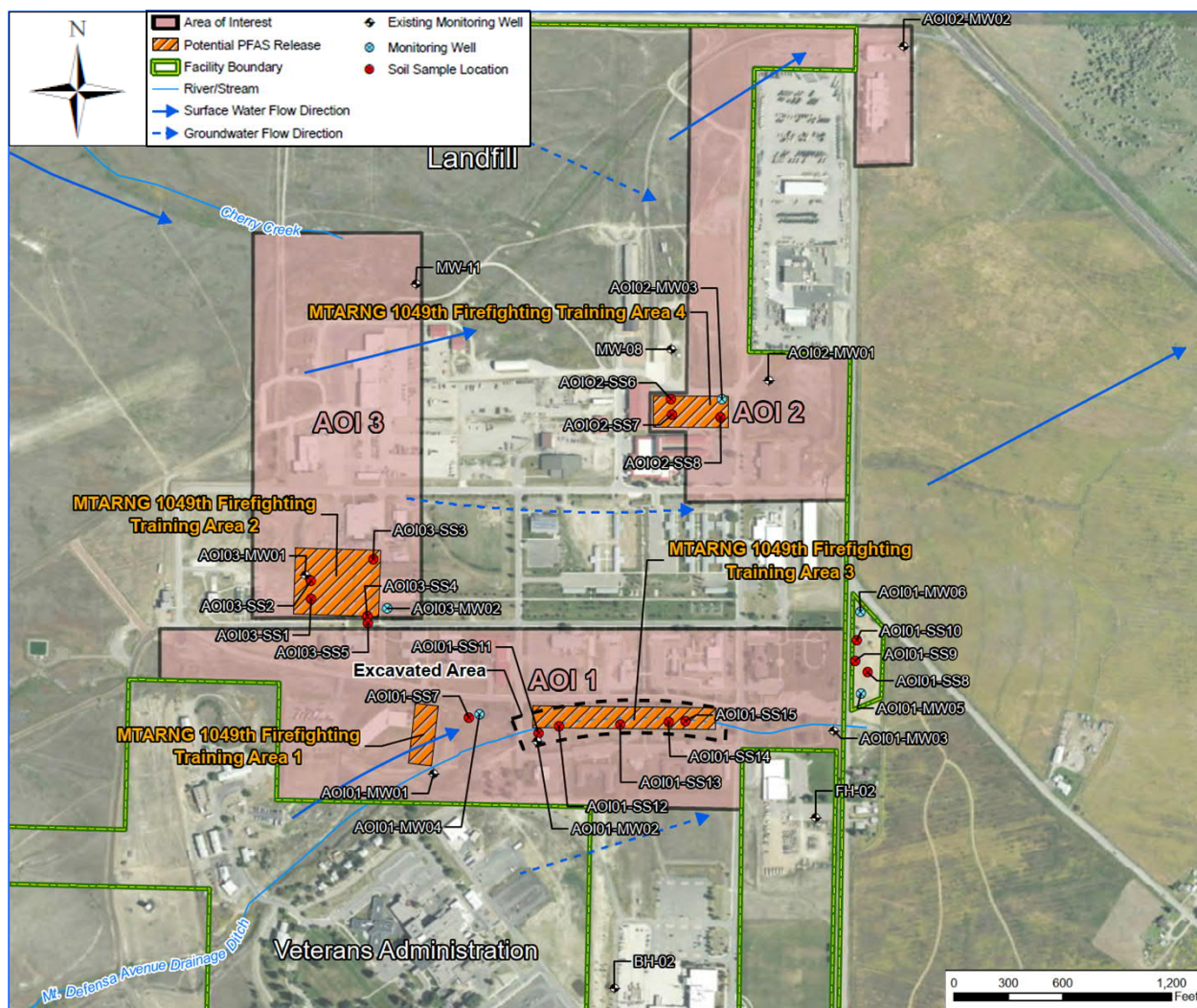






# SI – Summary of Approach

## SI Locations – Mobilization 2





# SI – Summary of Findings

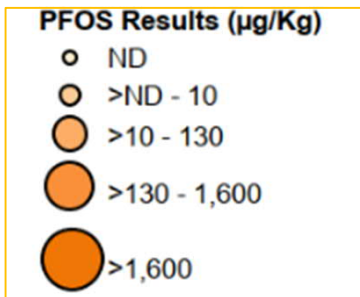
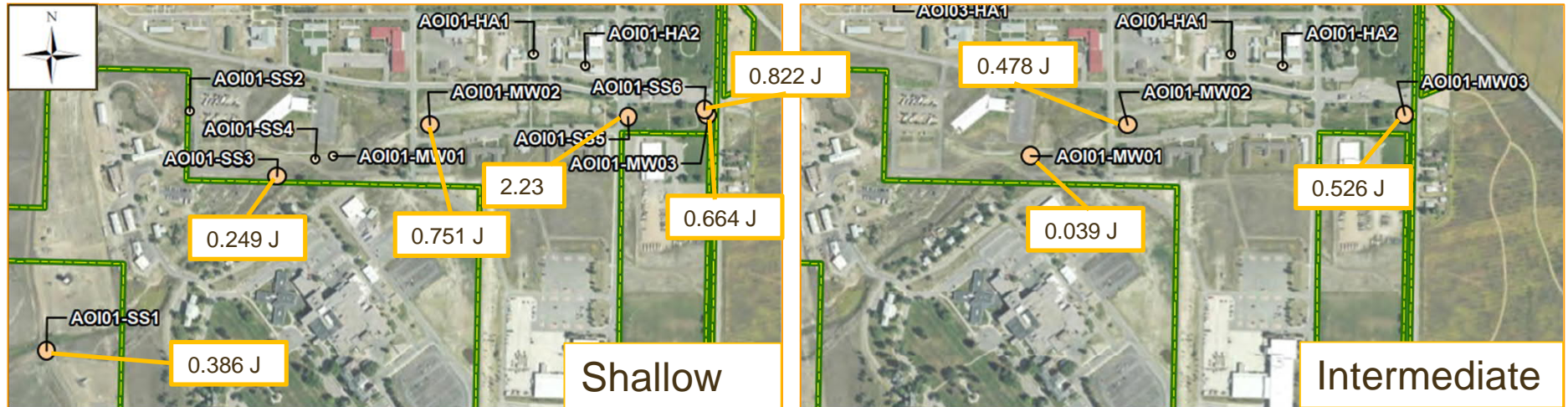
- PFAS in soil and groundwater confirmed in AOI 1, AOI 2, AOI 3 and at the facility boundary
- Soil Findings
  - PFOS, PFOA, and perfluorobutanesulfonic acid (PFBS) detected in soil, but at concentrations several orders of magnitude below the SLs.
- Groundwater Findings
  - Detections of PFOA, PFOS, PFBS detected in groundwater at all AOIs. PFOA and PFBS concentrations were below the SLs.
  - PFOS in groundwater >40 nanogram per liter (ng/L) at facility boundary in AOI 1; highest detection of PFOS in groundwater was 62.2 ng/L.
  - PFOS in groundwater >40 ng/L at facility boundary in AOI 2; highest detection of PFOS in groundwater was 118 ng/L.





# SI – Summary of Findings

## PFOS in Soil at AOI 1 Mobilization 1



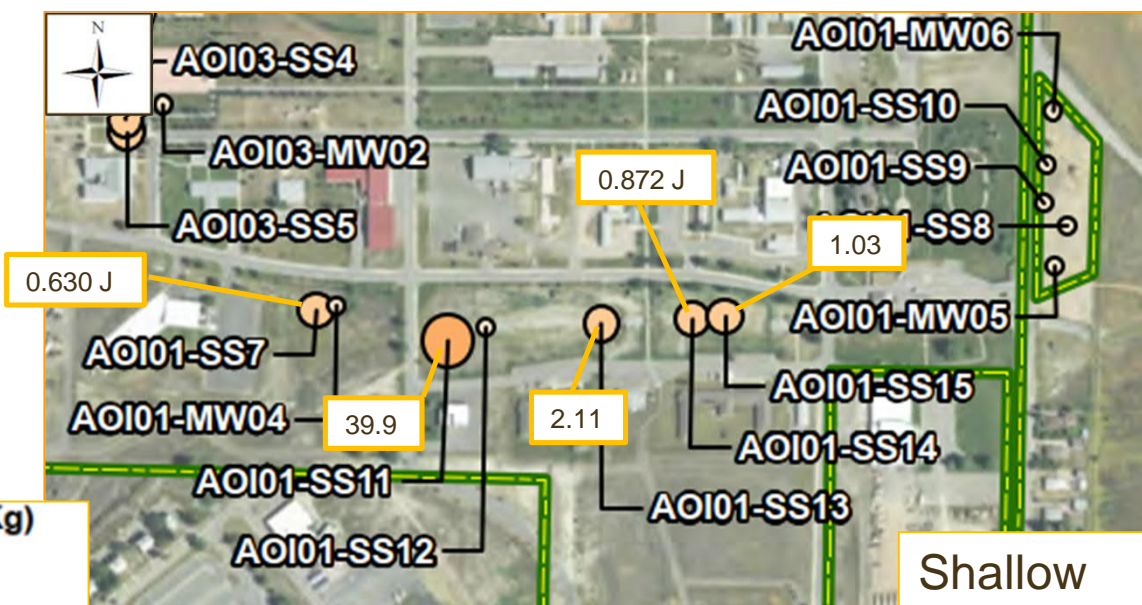
Analyte	Residential (Soil) (µg/kg) 0-2 feet bgs	Industrial Worker (Soil) (µg/kg) <sup>a</sup> 2-15 feet bgs
PFOA	130	1,600
PFOS	130	1,600





# SI – Summary of Findings

## PFOS in Soil at AOI 1 Mobilization 2



### PFOS Results (µg/Kg)

- ND
- >ND - 10
- >10 - 130
- >130 - 1,600
- >1,600

PFOS was not detected in the intermediate or deep soil intervals

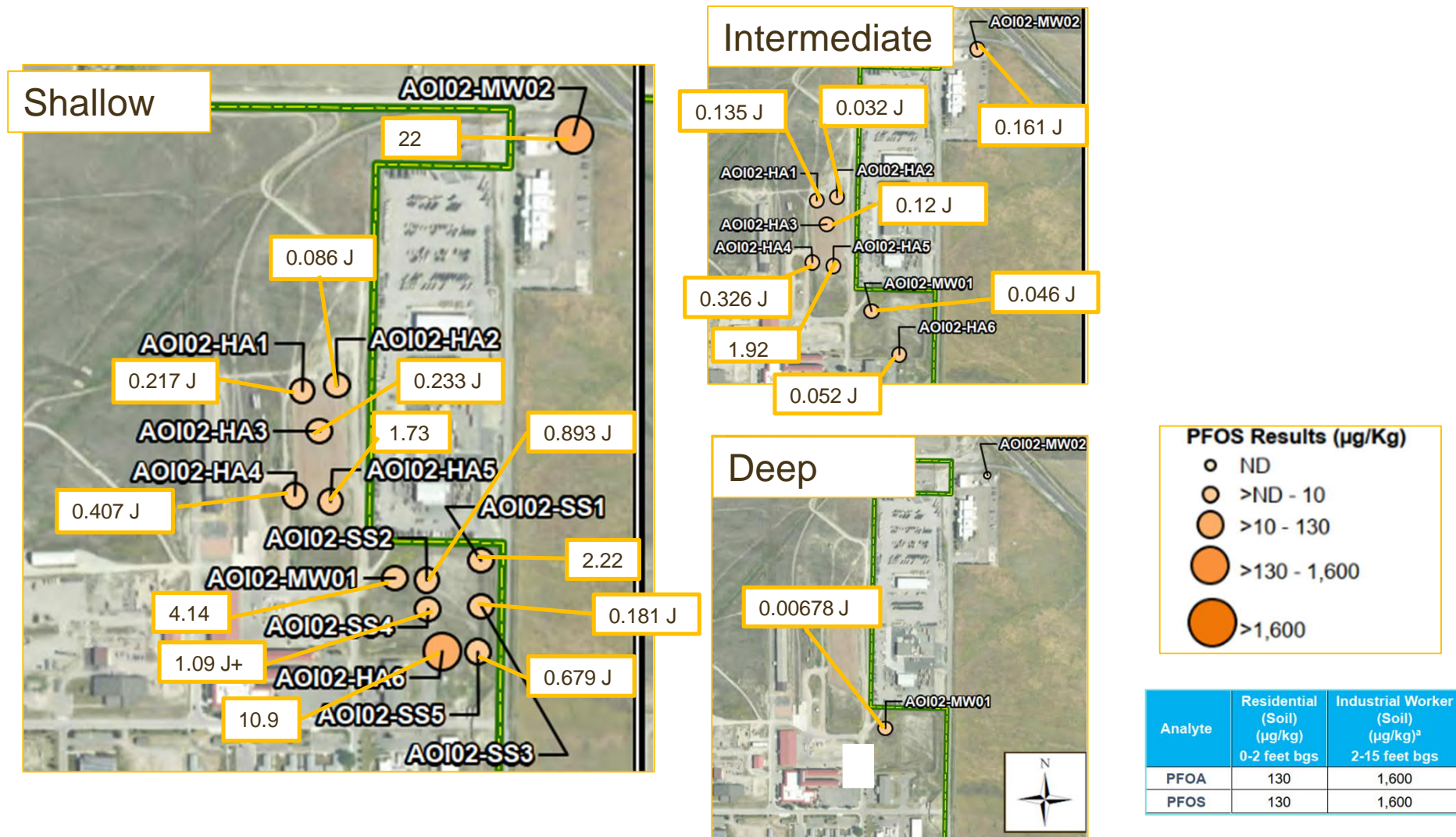
Analyte	Residential (Soil) (µg/kg) 0-2 feet bgs	Industrial Worker (Soil) (µg/kg) <sup>2</sup> 2-15 feet bgs
PFOA	130	1,600
PFOS	130	1,600





# SI – Summary of Findings

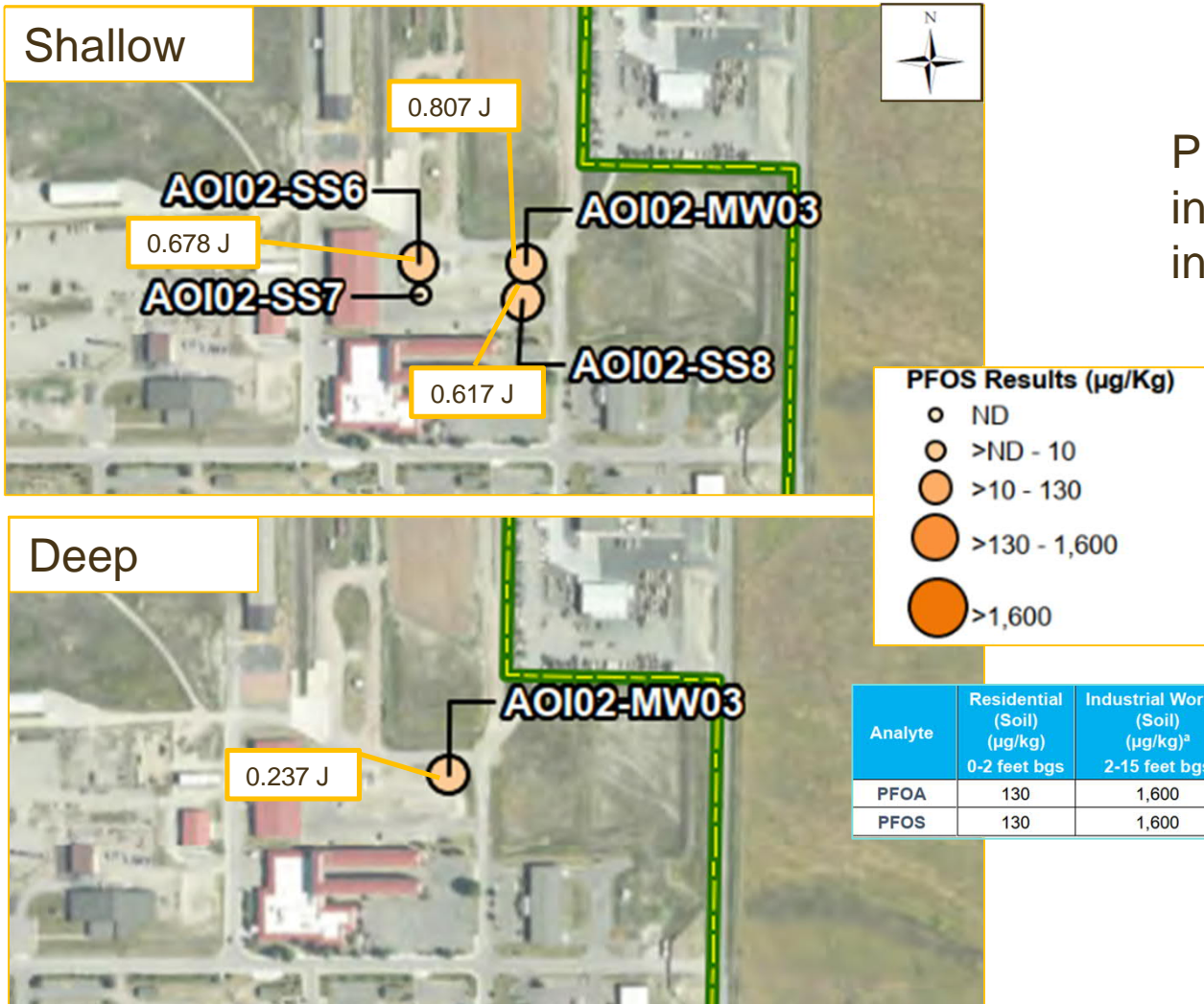
## PFOS in Soil at AOI 2 Mobilization 1





# SI – Summary of Findings

## PFOS in Soil at AOI 2 Mobilization 2

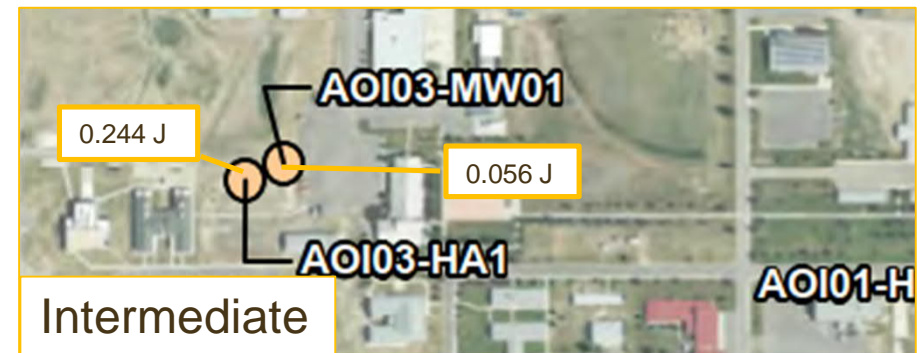
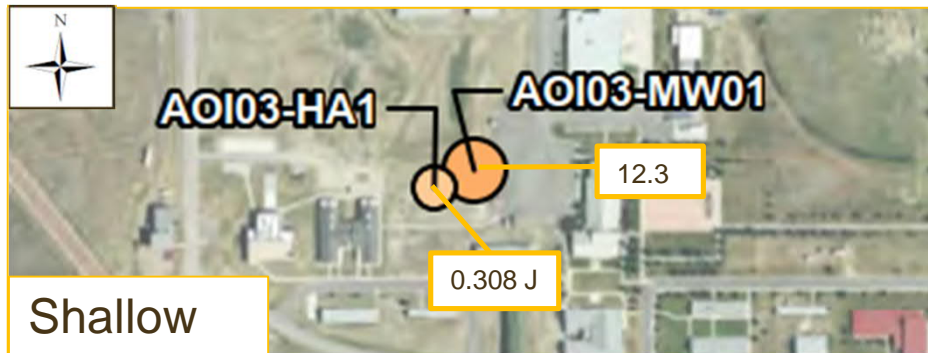


PFOS was not detected in the intermediate soil interval



# SI – Summary of Findings

## PFOS in Soil at AOI 3 Mobilization 1

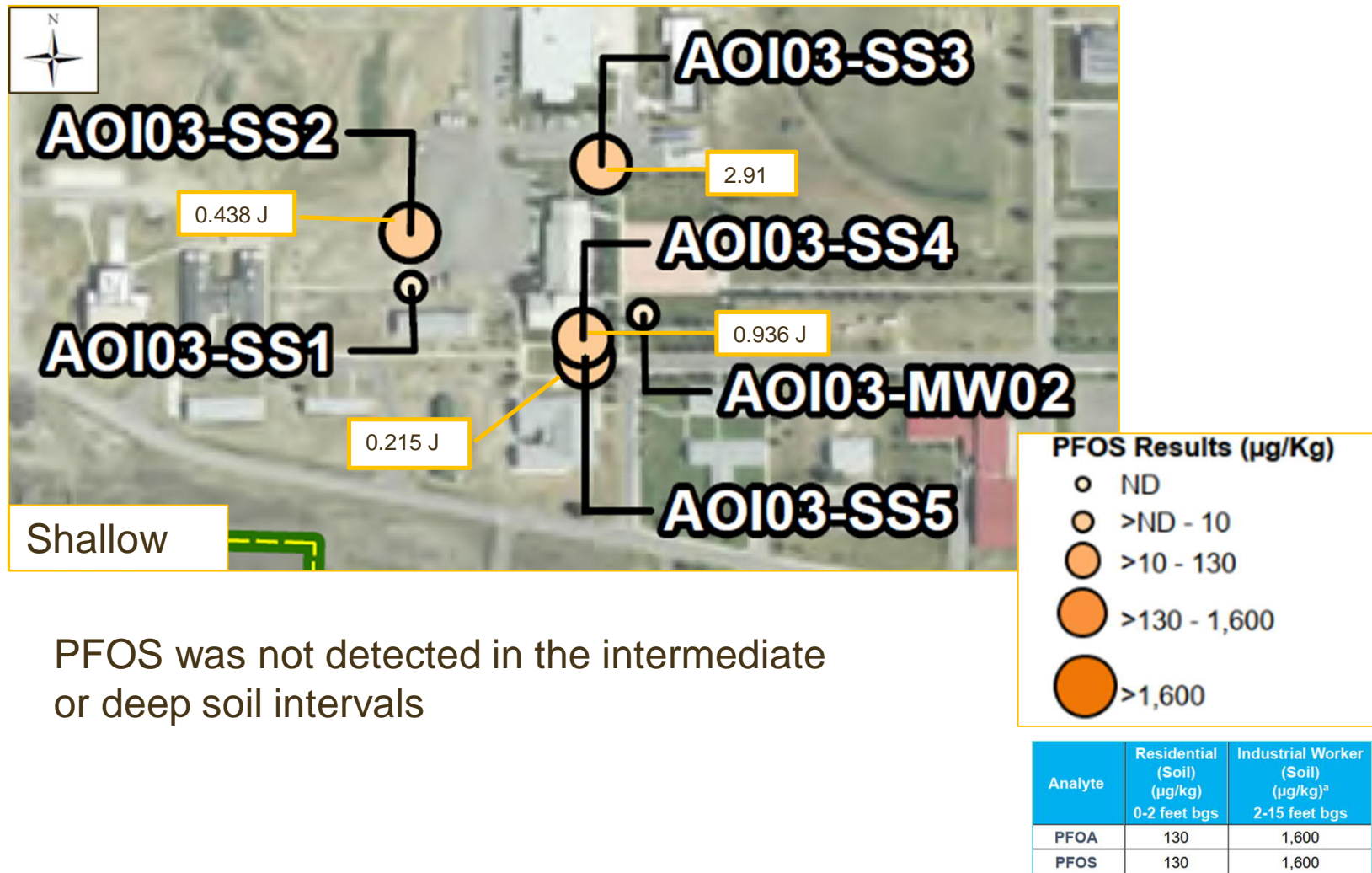






# SI – Summary of Findings

## PFOS in Soil at AOI 3 Mobilization 2



PFOS was not detected in the intermediate or deep soil intervals





# SI – Summary of Findings

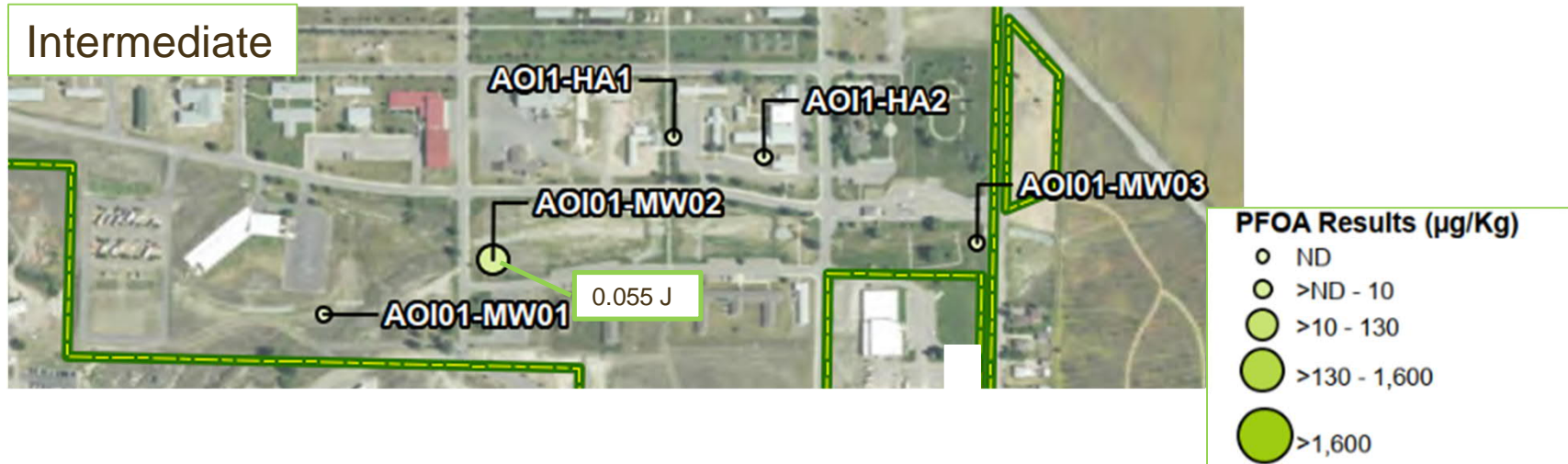
## PFOA in Soil at AOI 1 Mobilization 1

Shallow



PFOA was not detected in the deep soil interval

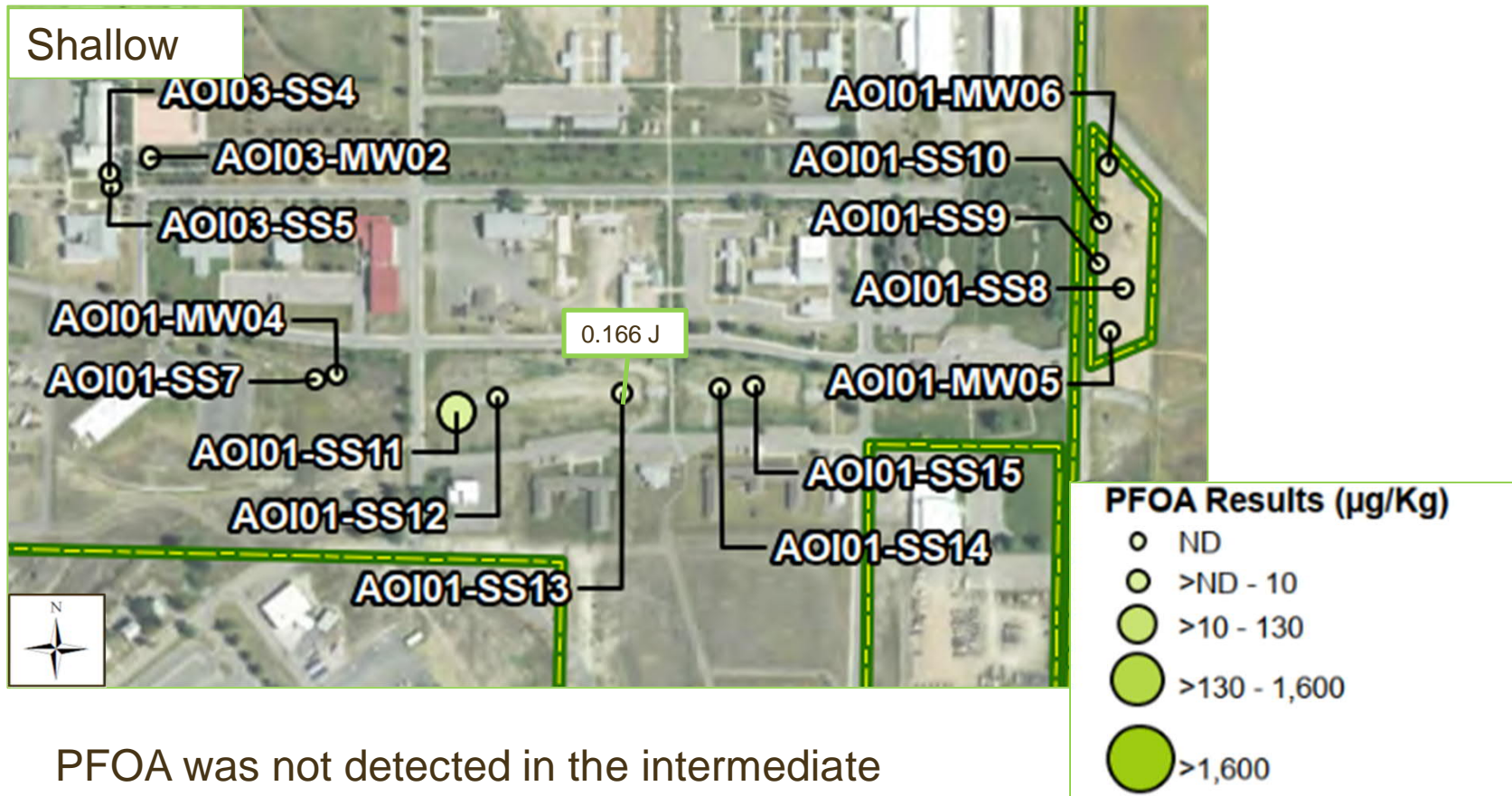
Intermediate





# SI – Summary of Findings

## PFOA in Soil at AOI 1 Mobilization 2



PFOA was not detected in the intermediate or deep soil intervals

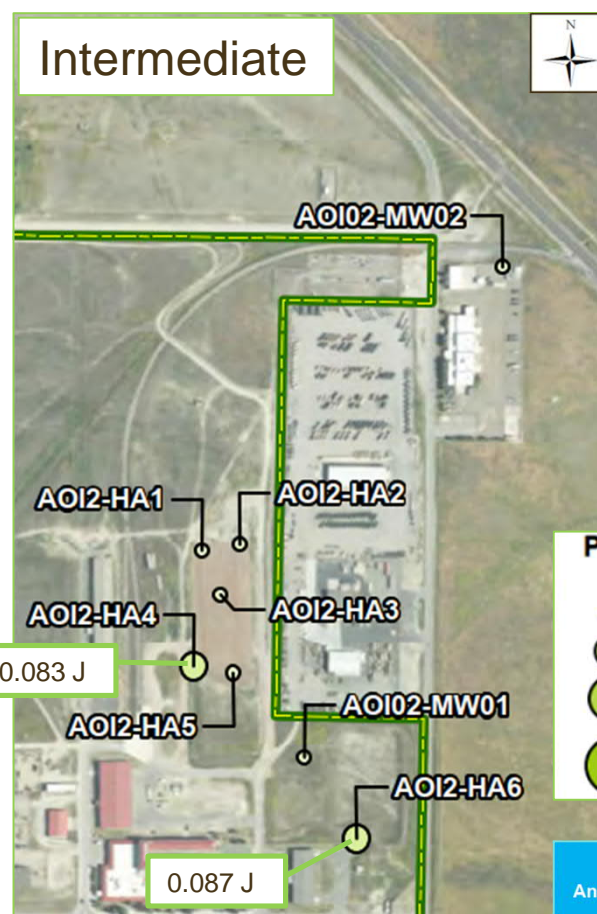
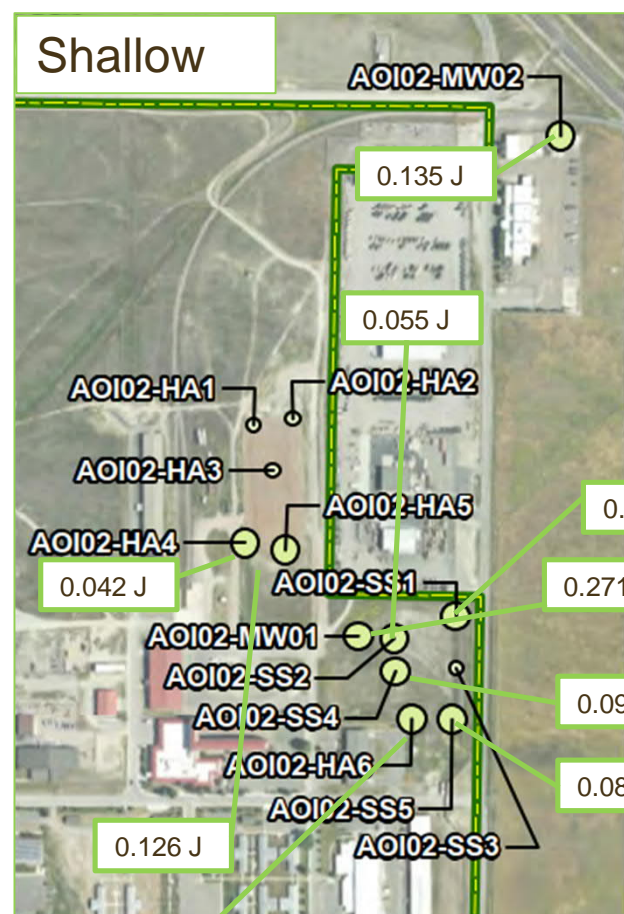
Analyte	Residential (Soil) (µg/kg) 0-2 feet bgs	Industrial Worker (Soil) (µg/kg) <sup>a</sup> 2-15 feet bgs
	PFOA 130	1,600
	PFOS 130	1,600





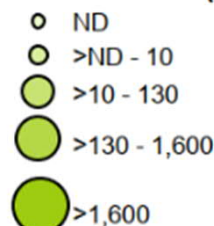
# SI – Summary of Findings

## PFOA in Soil at AOI 2 Mobilization 1



PFOA was not detected in the deep soil interval

### PFOA Results (µg/Kg)

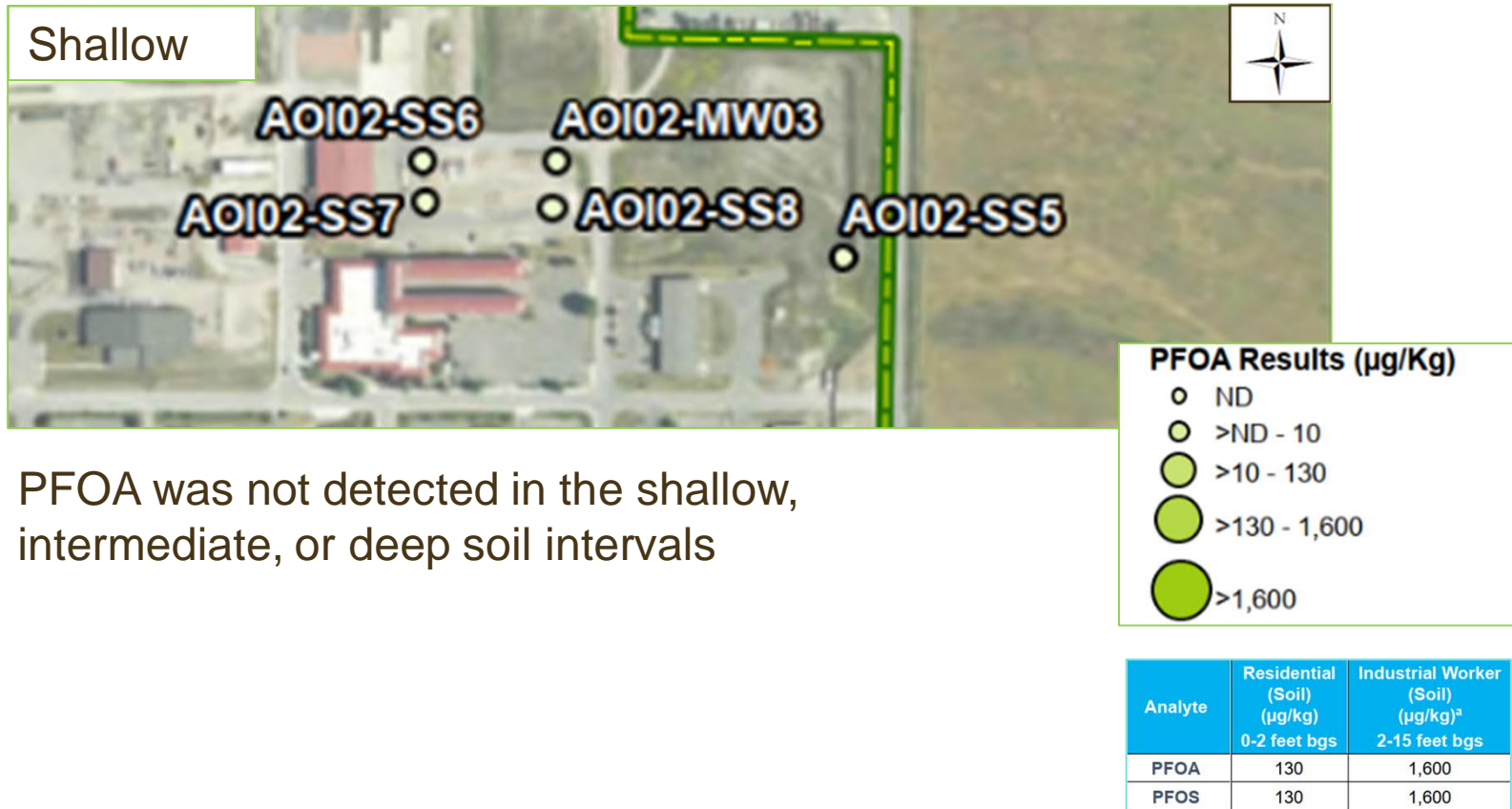


Analyte	Residential (Soil) (µg/kg)	Industrial Worker (Soil) (µg/kg) <sup>a</sup>
	0-2 feet bgs	2-15 feet bgs
PFOA	130	1,600
PFOS	130	1,600



# SI – Summary of Findings

## PFOA in Soil at AOI 2 Mobilization 2

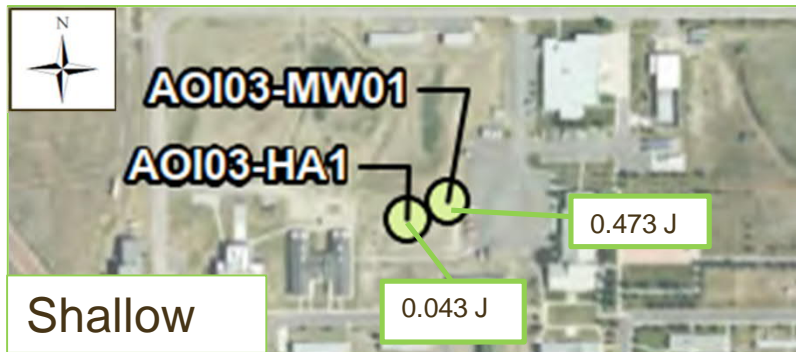






# SI – Summary of Findings

## PFOA in Soil at AOI 3 Mobilization 1



PFOA was not detected in the deep soil interval





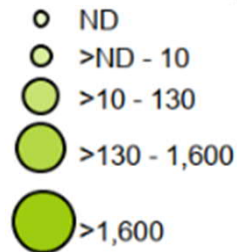
# SI – Summary of Findings

## PFOA in Soil at AOI 3 Mobilization 2



PFOA was not detected in the shallow, intermediate, or deep soil intervals

### PFOA Results (µg/Kg)



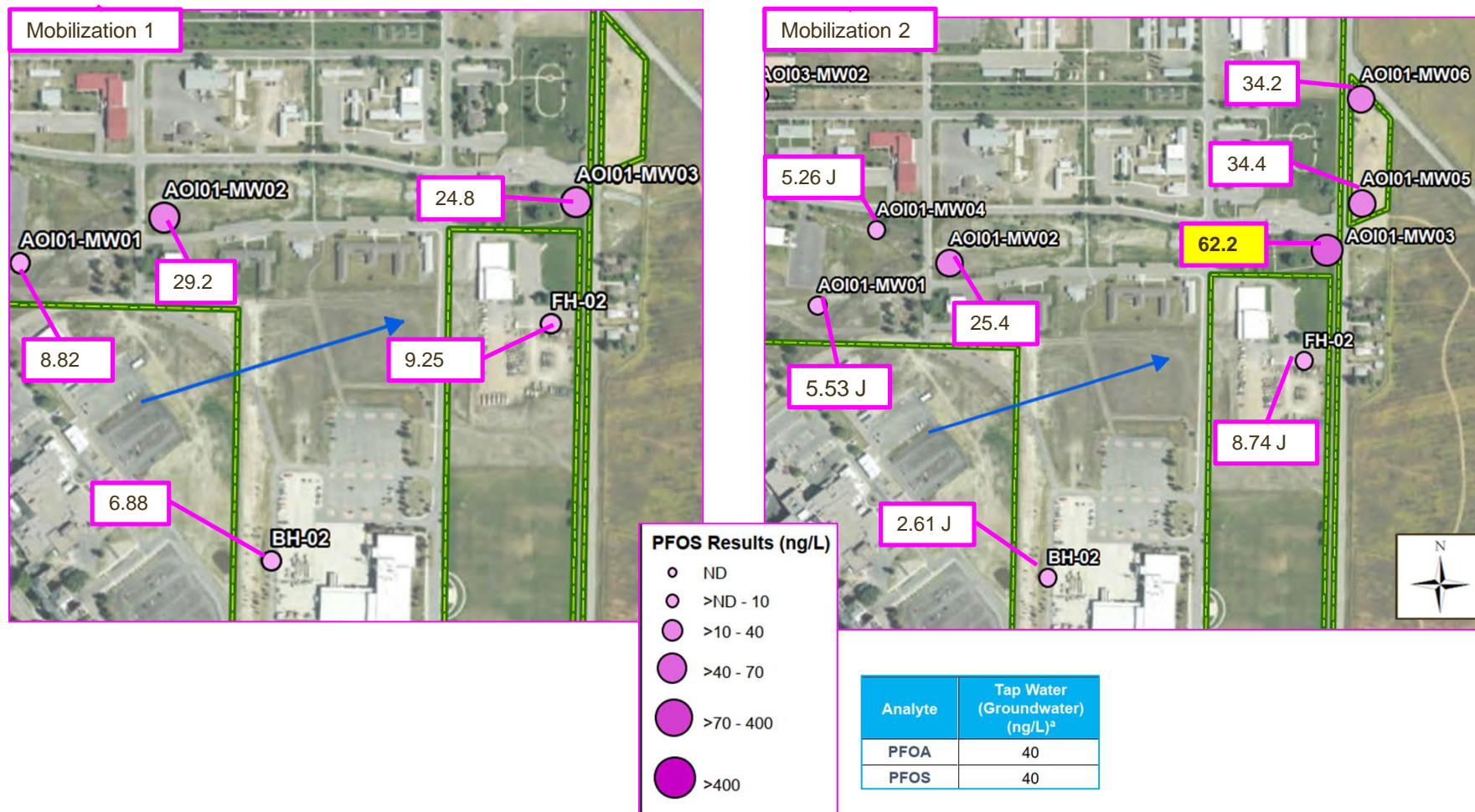
Analyte	Residential (Soil) (µg/kg) 0-2 feet bgs	Industrial Worker (Soil) (µg/kg) <sup>a</sup> 2-15 feet bgs
	PFOA 130	1,600
	PFOS 130	1,600



# SI – Summary of Findings

## PFOS in Groundwater at AOI 1

### Mobilization 1 and 2



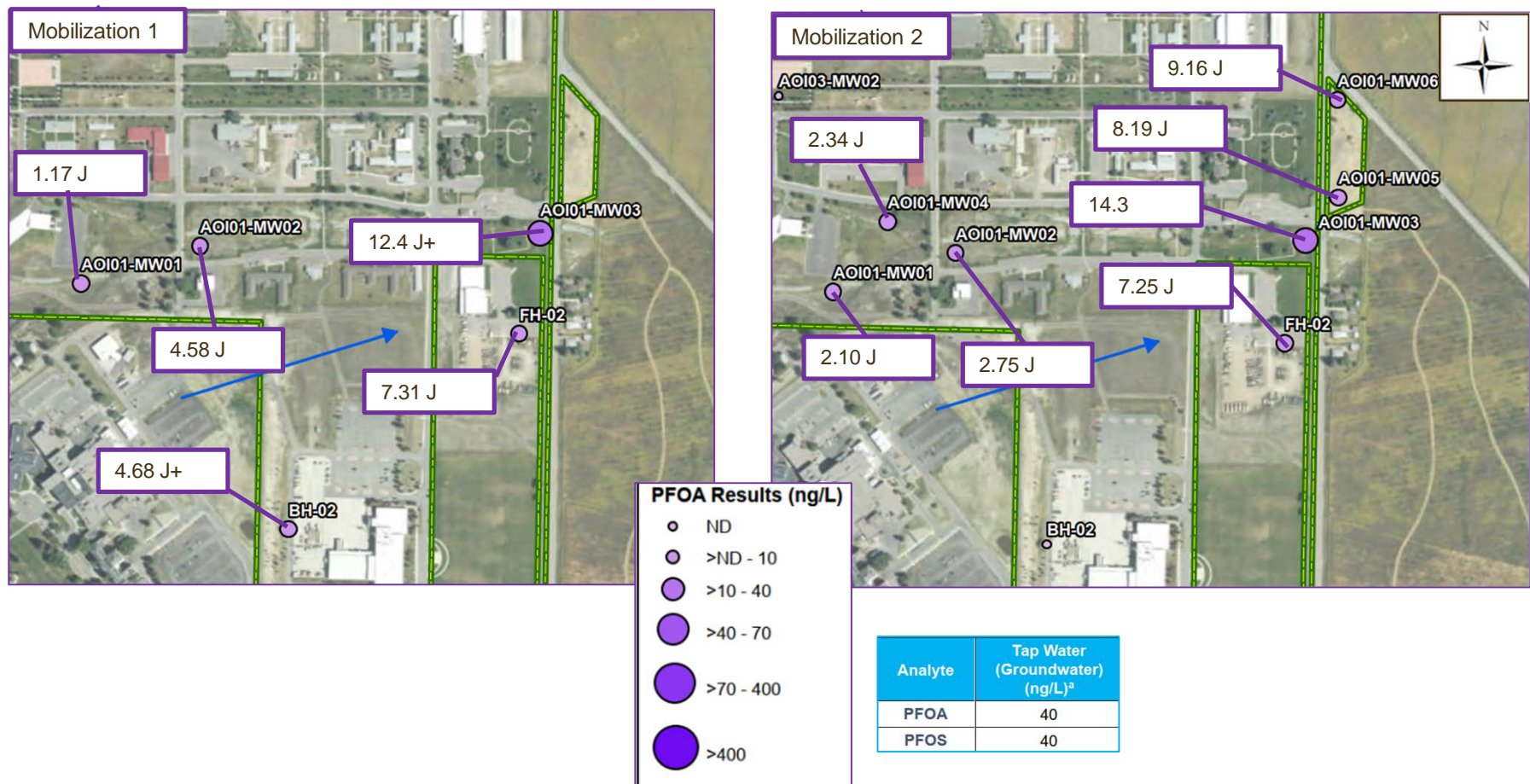




# SI – Summary of Findings

## PFOA in Groundwater at AOI 1

### Mobilization 1 and 2



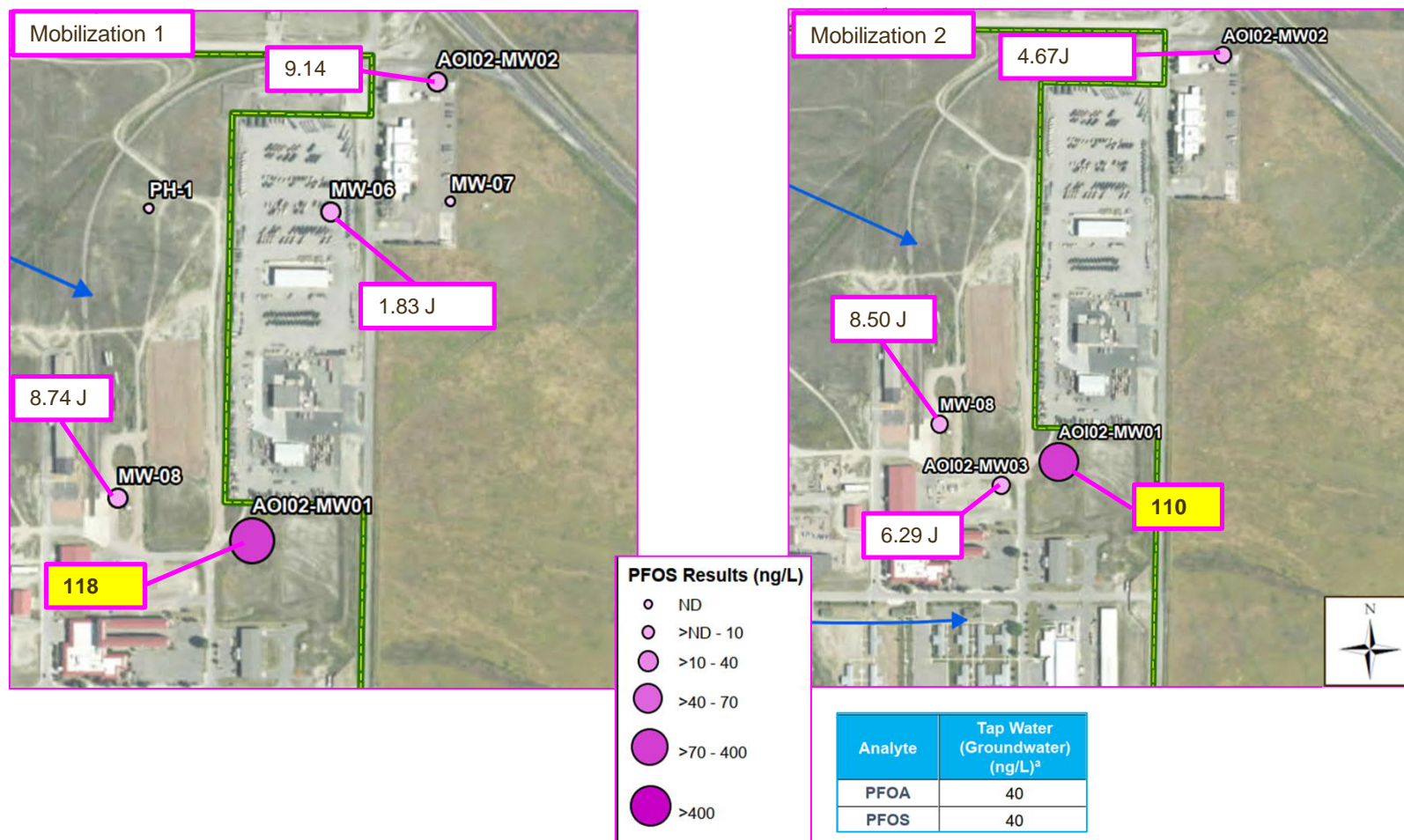




# SI – Summary of Findings

## PFOS in Groundwater at AOI 2

### Mobilization 1 and 2

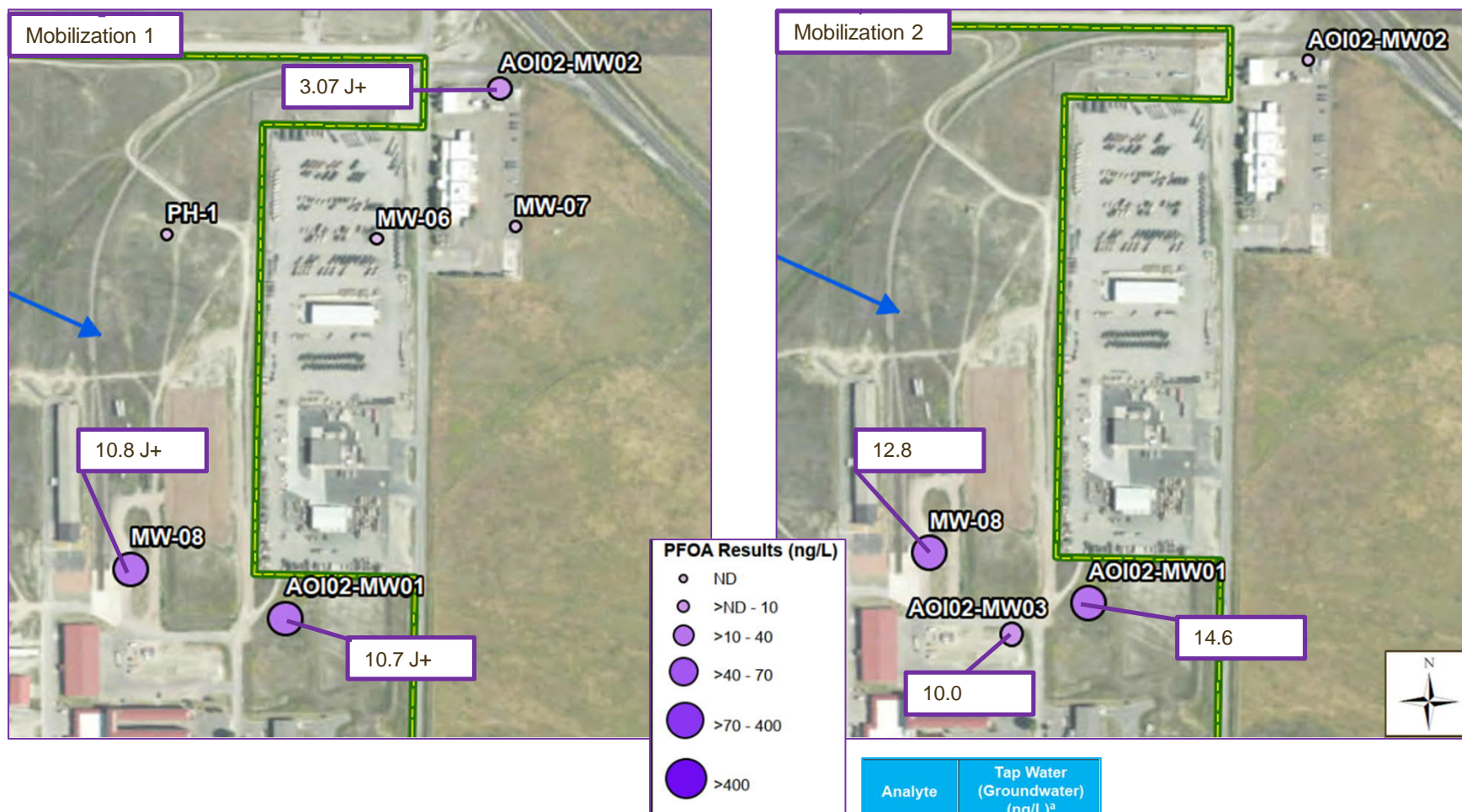




# SI – Summary of Findings

## PFOA in Groundwater at AOI 2

### Mobilization 1 and 2



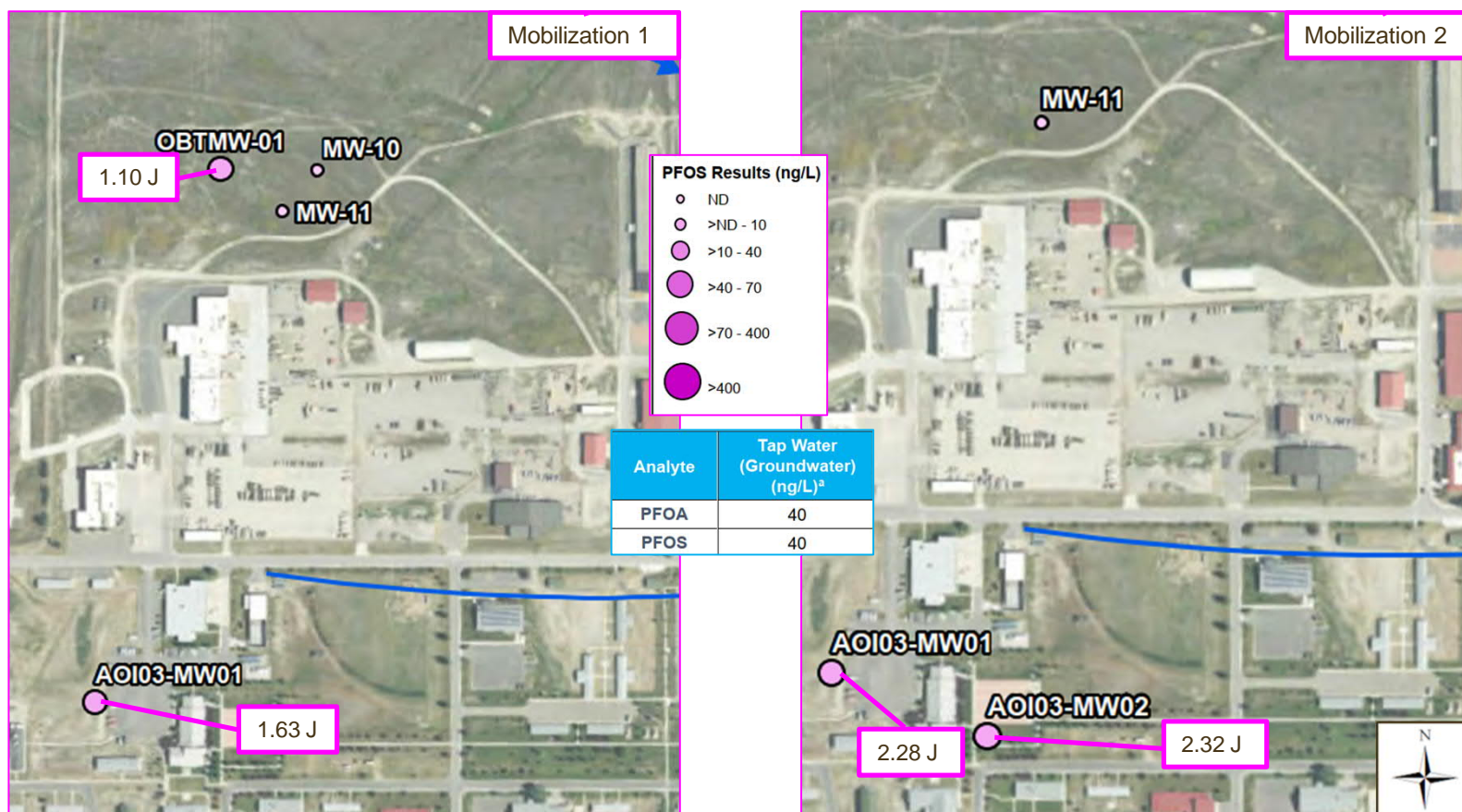




# SI – Summary of Findings

## PFOS in Groundwater at AOI 3

### Mobilization 1 and 2

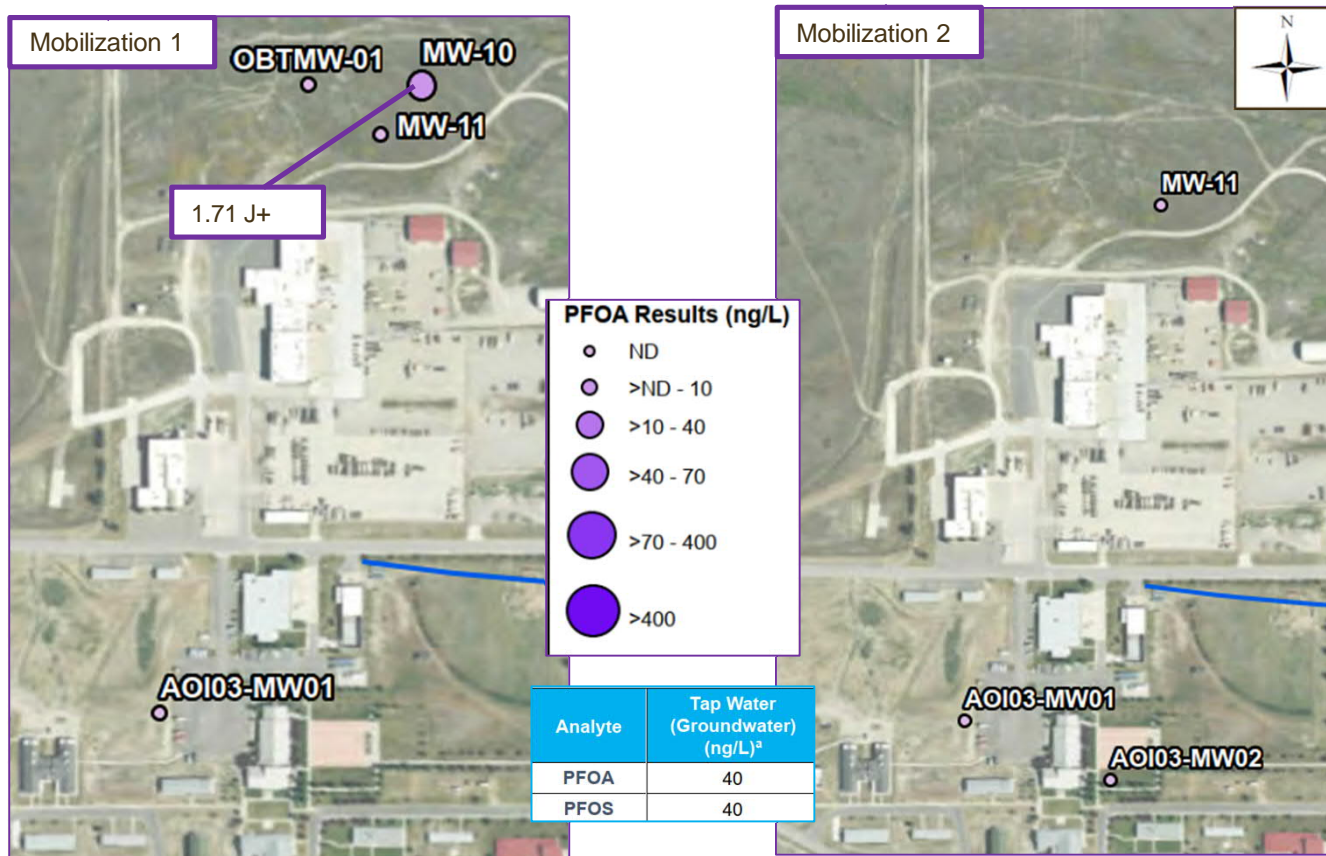




# SI – Summary of Findings

## PFOA in Groundwater at AOI 3

### Mobilization 1 and 2







# SI – Summary of Findings

## Potable Well Sampling

- Potable well samples collected from five locations in closest proximity to the facility boundary (downgradient of AOI 1).
  - PFOA – Detections ranged from 3.75 ng/L (Potable-02) to 16.6 ng/L (Potable-05).
  - PFOS – Detections ranged from 3.11 ng/L (Potable-02) to 22.1 ng/L (Potable-05).
  - PFBS – Detections ranged from 2.48 ng/L (Potable-04) to 21.2 ng/L (Potable-05).



# SI – Summary of Findings

AOI	Potential PFAS Release Area	Soil – Source Area	Groundwater – Source Area	Groundwater – Facility Boundary
1	Mt. Defensa Avenue Drainage Ditch			
1	1049th Engineer Detachment Building 1010			NA
1	Prairie Dog Relocation (three locations)		NA	NA
1	1049th Firefighting Training Area 1			NA
1	1049th Firefighting Training Area 3		NA	NA
1	MacDonald Property			NA
2	Former Weasel Barn			
2	Excavated Soil from Mt. Defensa Ave Drainage Ditch			
2	1049th Engineer Detachment Building M1			
2	1049th Firefighting Training Area 4			NA
3	Planned Structure Fire			NA
3	Burial Trench	NA		NA
3	1049th Firefighting Training Area 2			NA

**Legend:**

NA = Not applicable (samples not at facility boundary)

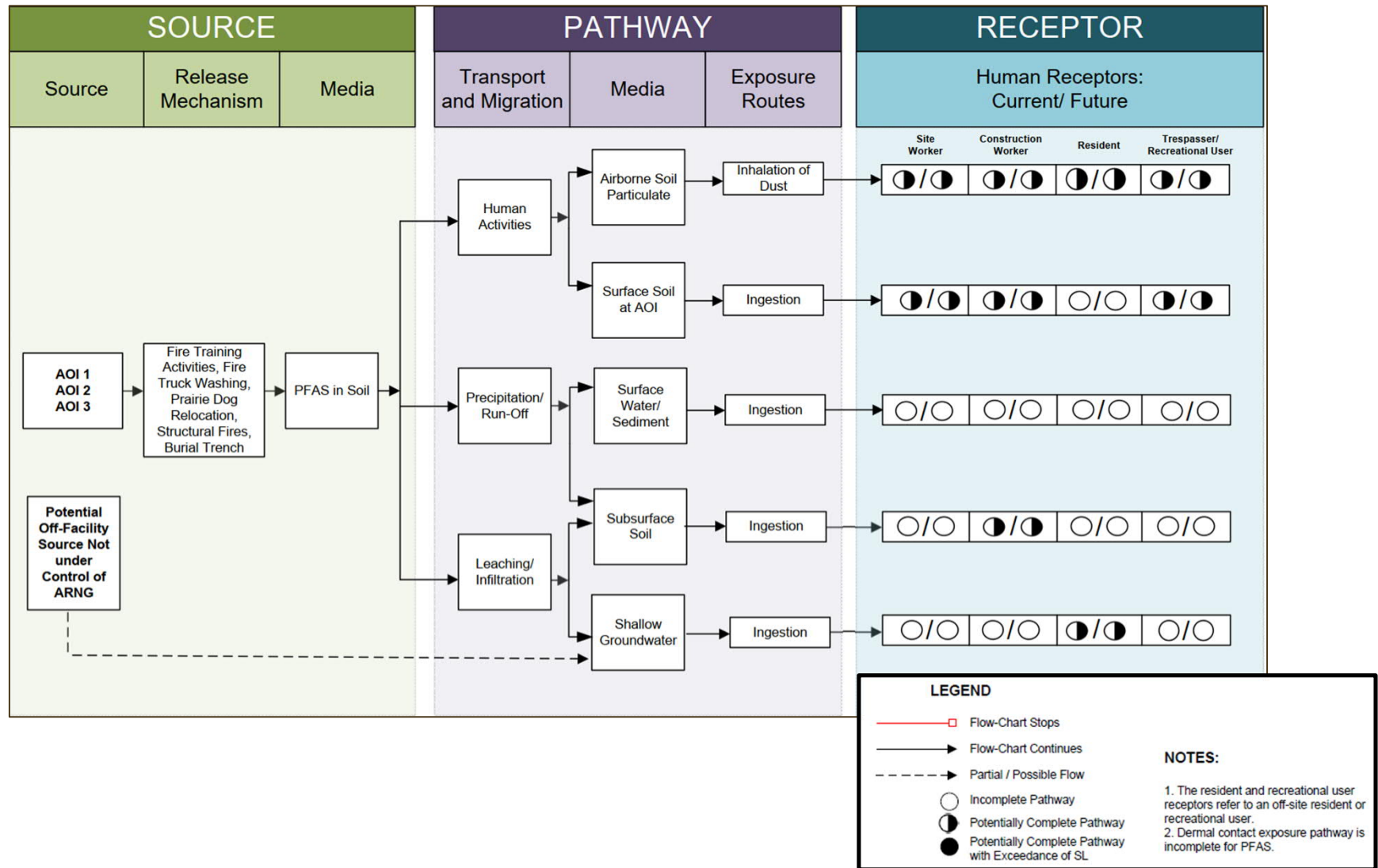
= detected; exceedance of the screening levels

= detected; no exceedance of the screening levels

= not detected



# SI – Summary of Findings





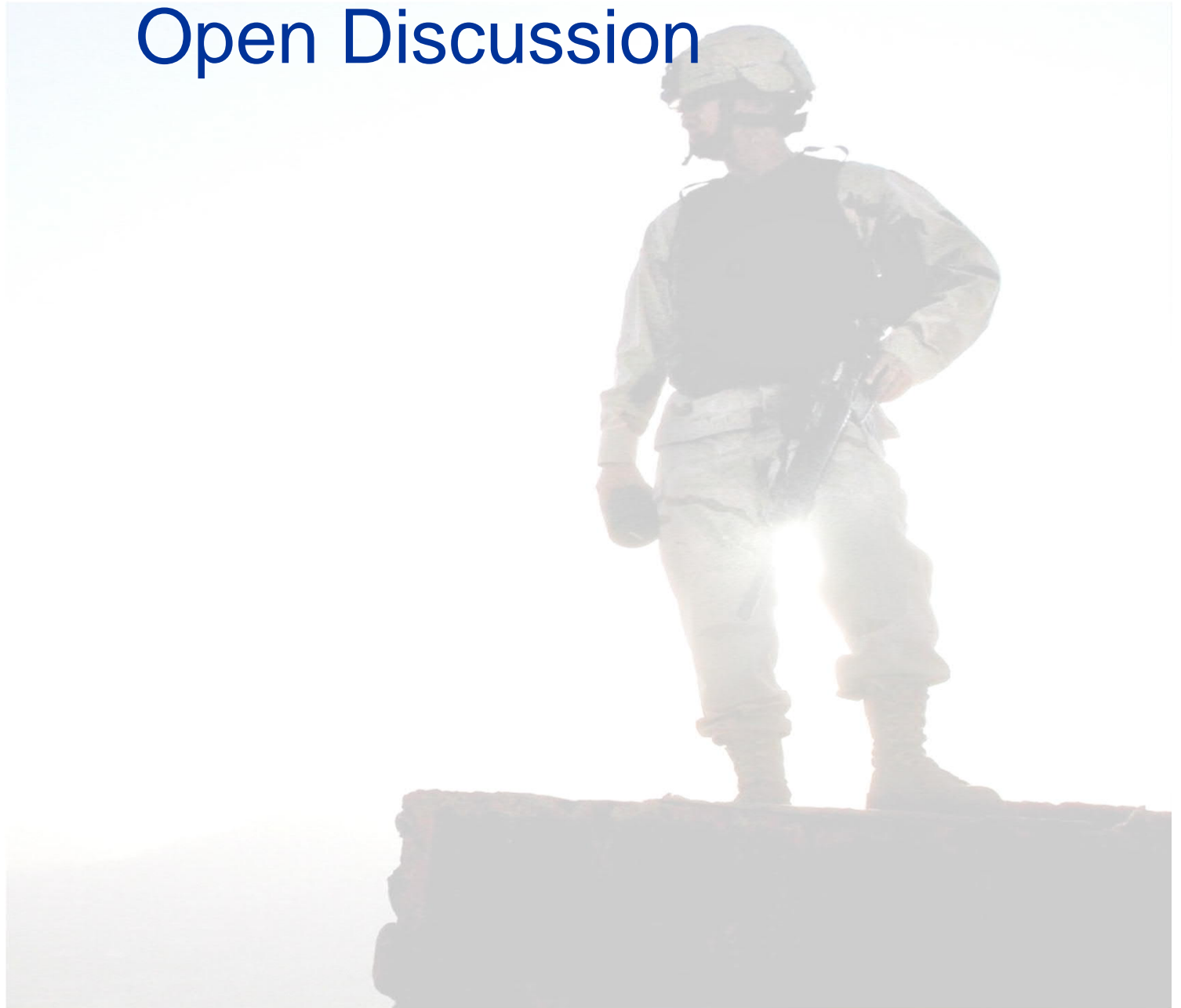
# Next Steps

- Finalize SI Report
  - Address comments from Montana DEQ
  - Schedule
- Initiate next step in CERCLA process: RI





# Open Discussion





# Acronyms

- AAAF – aqueous film forming foam
- AOI – area of interest
- ARNG – Army National Guard
- bgs – below ground surface
- CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act
- CSM – conceptual site model
- DEQ – Department of Environmental Quality
- DoD – US Department of Defense
- DQO – data quality objective
- MTARNG – Montana Army National Guard
- ng/L – nanograms per liter
- OSD – Office of the Secretary of Defense
- PA – Preliminary Assessment
- PFAS – per- and polyfluoroalkyl substances
- PFBS – perfluorobutanesulfonic acid
- PFOA – perfluorooctanoic acid
- PFOS – perfluorooctanesulfonic acid
- RI – Remedial Investigation
- SI – Site Inspection
- SL – screening level
- TPP – Technical Project Planning
- US – United States
- UFP-QAPP – Uniform Federal Policy- Quality Assurance Project Plan
- USACE – U.S. Army Corp of Engineers

## **Montana DEQ Memorandum**

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July 21, 2021

Mark Leeper P.G., MBA  
Remediation Project Manager  
ARNG Cleanup & Restoration Branch  
111 South George Mason Drive  
Arlington, VA 22204

**Subject: Review of the June 2021 Draft Final Site Inspection Report and Response to Comments Comment Matrix for the Draft Final Site Inspection Report for Fort William Henry Harrison, Helena, Montana**

Dear Mr. Leeper:

On behalf of the Montana Department of Environmental Quality (DEQ) I would like to thank you for providing the June 2021 Draft Final Site Inspection (SI) Report Fort William Henry Harrison, Helena Montana. DEQ received an electronic version of the Draft Final SI Report on June 30, 2021. DEQ personnel have reviewed the Draft Final SI Report and Army National Guard (ANG) contractor's Response to Comments Comment Matrix. ANG's contractor (AECOM) has adequately addressed DEQ's May 17, 2021 comments on the April 2021 Draft Final Site Inspection Report, Fort William Henry Harrison, Helena, MT. DEQ recognizes that the ANG intends on using the screening levels (SLs) for perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA), and perfluorobutanesulfonic acid (PFBS) set forth in the October 15, 2019 memorandum from the Office of the Secretary of Defense "(Memorandum)". ANG also needs to comply with State groundwater standards during the CERCLA process.

DEQ has promulgated numeric groundwater standards for PFOS and PFOA. These can be found in Circular DEQ-7 Montana Numeric Water Quality Standards (DEQ-7). PFOS and PFOA have an individual standard of 70 nanogram per liter (ng/L) ng/L and the sum of the concentrations of PFOA and PFOS shall not exceed the individual standard.

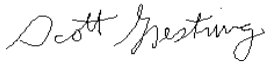
The Fort Harrison Site Inspection indicated exceedances of ANG SLs and DEQ-7 standards in two onsite groundwater monitoring wells. Groundwater monitoring well AOI-MW3, located in Area of Interest (AOI) 1, reported a PFOS concentration of 62.2 ng/L exceeding the ANG SL of 40 ng/L. AOI-MW3 reported PFAS at 13.5 ng/L. The combined PFOS and PFOA concentration exceeds DEQ-7. Groundwater monitoring well AOI2-MW1, located in AOI1, reported 118 ng/L PFOS exceeding both the DEQ-7 standard and the ANG SL.

Final Site Inspection Report  
Fort Harrison, Helena, MT  
July 21, 2021

Please include the Memorandum in an appendix in the Final SI Report. After finalizing the Site Inspection Report, please submit a hard copy and an electronic copy to the DEQ.

If you have any questions, please contact me at (406) 444-6471 or at [sgestring@mt.gov](mailto:sgestring@mt.gov).

Sincerely,



Scott Gestring  
DSMOA Project Officer  
DEQ Cleanup, Protection and Redevelopment Section

Ec.      Mark Leeper, P.G. RPM  
Adele Johnson, LTC, MTARNG Environmental Program Manager  
Wade Juntunen, MTARNG Remediation/UXO Project Manager  
Katie Morris, DEQ CPR Section Manager  
Scott Gestring, DEQ CPR PM  
Lee McKenna, DEQ Legal,  
Jady Harrington, AECOM  
Laurel Riek, Lewis & Clark County R.S.  
Kathy Moore, Lewis & Clark County Environmental DA  
Peter Schade, Lewis & Clark County

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## **Appendix E**

### **Boring Logs and Well Construction**

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<b>CLIENT</b> ARNG, USACE Baltimore District	<b>PROJECT NAME</b> Fort William Henry Harrison
<b>PROJECT NUMBER</b> 60552172	<b>SITE NAME</b> AOI 1
<b>DATE STARTED</b> 2/13/19 <b>COMPLETED</b> 2/14/19	<b>EASTING</b> N/A <b>NORTHING</b> N/A
<b>DRILLING CONTRACTOR</b> Cascade	<b>GROUND ELEVATION</b> N/A <b>HOLE SIZE</b> 6 inches
<b>DRILLING EQUIPMENT</b> MiniSonic LS250	<b>GROUND WATER LEVELS:</b>
<b>DRILLING METHOD</b> Roto Sonic	<b>AT TIME OF DRILLING</b> ---
<b>LOGGED BY</b> C. Beza <b>CHECKED BY</b> K. ODonnell	<b>AT END OF DRILLING</b> ---

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ENVIRONMENTAL DATA	WELL DIAGRAM
0.0							
2.5		78	SP		0.0 Poorly-Graded Sand with Gravel (SP), moist, dark gray, fine grained, 15-25% fine to coarse angular gravel. 2.0 Changes to dry, pale yellow.	AOI1-SB-0-2	<b>Backfill</b> Top: 0 ft bgs Bottom: 41 ft bgs
5.0			GP		5.0 Poorly-Graded Gravel with Sand (GP), dry, olive gray, coarse to very coarse grained, gap graded, angular, 30-45% fine sand, contains cobbles. 7.0 Changes to blueish gray hue.		
10.0		100					
12.5		95	SW		10.0 Well-Graded Sand with Gravel (SW), dry, light brown, fine to coarse grained, gap graded, 30-45% medium to very coarse angular gravel.		<b>Well Casing</b> Type: Schedule 40 PVC Diameter: 2 in Top: 0 ft bgs Bottom: 55 ft bgs
15.0							

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**CLIENT** ARNG, USACE Baltimore District

**PROJECT NAME** Fort William Henry Harrison

**PROJECT NUMBER** 60552172

**SITE NAME** AOI 1

ARNG SMART LOG 8.5X11 - CINTAS LAUREL.GPJ - 7/3/19 13:12 - Q:\PROJECTS\ENV\GEOARS\GEO\ARNG PFAS\900-CAD-GIS\930-OTHER\GINT\FTWHH.GPJ

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ENVIRONMENTAL DATA	WELL DIAGRAM
15.0							
17.5		88			15.0 Changes to moist, 30-45% coarse to very coarse angular gravel, 10-15% silt.		
20.0			GP		20.0 Poorly-Graded Gravel with Sand (GP), dry, light brown, coarse to very coarse grained, gap graded, angular, 30-45% fine to coarse sand.	AOI1-SB1-20-22	
22.5		78			22.5 4-inch cobble.		
25.0					25.0 Changes to dry to moist.		
27.5							
30.0		83					

**Well Casing**  
Type: Schedule  
40 PVC  
Diameter: 2 in  
Top: 0 ft bgs  
Bottom: 55 ft bgs

(Continued Next Page)







**CLIENT** ARNG, USACE Baltimore District

**PROJECT NAME** Fort William Henry Harrison

**PROJECT NUMBER** 60552172

**SITE NAME** AOI 1

ARNG SMART LOG 8.5X11 - CINTAS LAUREL.GPJ - 7/3/19 13:12 - Q:\PROJECTS\ENV\GEOARS\GEO\ARNG PFAS\900-CAD-GIS\930-OTHER\GINT\FTWHH.GPJ

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ENVIRONMENTAL DATA	WELL DIAGRAM
32.5			GP		32.0 5-inch cobble. 20.0 Poorly-Graded Gravel with Sand (GP), dry, light brown, coarse to very coarse grained, gap graded, angular, 30-45% fine to coarse sand. <i>(continued)</i>		
35.0			SW		34.5 5-inch cobble. 35.0 Well-Graded Sand with Gravel (SW), moist, brown to light brown, fine to coarse grained, well graded, 30-45% fine to coarse angular gravel.		
37.5			SC		40.0 Clayey Sand with Gravel (SC), dry to moist, light brown, fine grained, gap graded, 15-25% coarse to very coarse gravel, 30-45% clay.		
40.0		100	ML		43.0 Gravelly Silt (ML), dry, light brown, nonplastic, 15-25% fine angular gravel.		
42.5			CL-ML		45.0 Silty Clay (CL-ML), moist, light yellowish brown, low plasticity, 15-25% coarse to very coarse gravel.		
45.0			SW		47.5 Well-Graded Sand with Gravel (SW), moist, brown, fine to coarse grained, well graded, 15-25% fine angular gravel.		
47.5		80					

AOI1-SB1-38-40

**Well Casing**  
Type: Schedule 40 PVC  
Diameter: 2 in  
Top: 0 ft bgs  
Bottom: 55 ft bgs

**Well Seal**  
Type: Bentonite Medium Chip  
Top: 41 ft bgs  
Bottom: 43 ft bgs

**Filter Pack**  
Type: #2 Filter Sand  
Top: 43 ft bgs  
Bottom: 55 ft bgs



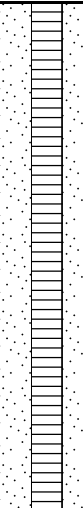
(Continued Next Page)

CLIENT ARNG, USACE Baltimore District

PROJECT NAME Fort William Henry Harrison

PROJECT NUMBER 60552172

SITE NAME AOI 1

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ENVIRONMENTAL DATA	WELL DIAGRAM
50.0			SW		47.5		
52.5		83	ML		50.0 Silt (ML), wet, white to light gray, low plasticity, <5% fine to medium sand.	AOI-MW1-50-55	
55.0							

Bottom of borehole at 55.0 feet.

**Notes:**

- Headspace screening values represent total volatile organic vapors (referenced to an isobutylene standard) measured with a Photoionization Detector (PID) with 10.6 eV lamp.
- Coordinates and elevation data in NAVD88 for vertical datum and NAD83/91 for horizontal datum in Montana State Plane.

**Well Casing**  
Type: Schedule  
40 PVC  
Diameter: 2 in  
Top: 0 ft bgs  
Bottom: 55 ft bgs**Well Screen**  
Type: Schedule  
40 PVC  
Slot Size: 0.01 in  
Top: 45 ft bgs  
Bottom: 55 ft bgs**Well Screen**  
Type: Schedule  
40 PVC  
Slot Size: 0.01 in  
Top: 45 ft bgs  
Bottom: 55 ft bgs



<b>CLIENT</b> <u>ARNG, USACE Baltimore District</u>	<b>PROJECT NAME</b> <u>Fort William Henry Harrison</u>
<b>PROJECT NUMBER</b> <u>60552172</u>	<b>SITE NAME</b> <u>AOI 1</u>
<b>DATE STARTED</b> <u>2/14/19</u> <b>COMPLETED</b> <u>2/15/19</u>	<b>EASTING</b> <u>N/A</u> <b>NORTHING</b> <u>N/A</u>
<b>DRILLING CONTRACTOR</b> <u>Cascade</u>	<b>GROUND ELEVATION</b> <u>N/A</u> <b>HOLE SIZE</b> <u>6 inches</u>
<b>DRILLING EQUIPMENT</b> <u>MiniSonic LS250</u>	<b>GROUND WATER LEVELS:</b>
<b>DRILLING METHOD</b> <u>Roto Sonic</u>	<b>AT TIME OF DRILLING</b> <u>---</u>
<b>LOGGED BY</b> <u>C. Beza</u> <b>CHECKED BY</b> <u>K. ODonnell</u>	<b>AT END OF DRILLING</b> <u>---</u>

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ENVIRONMENTAL DATA	WELL DIAGRAM
0.0			SP		0.0 Poorly-Graded Sand with Gravel (SP), dry, brown, fine grained, gap graded, 15-25% fine angular gravel.		
2.5		40				AOI1-SB2-0-2	
5.0			SM		5.0 Silty Sand with Gravel (SM), dry, brown, fine grained, gap graded, 15-25% silt, 15-25% fine angular gravel, contains carbonate gravel.		
7.5		100					
10.0			GW		10.0 Well-Graded Gravel with Sand (GW), dry, brown, medium to very coarse grained, angular, well graded, 30-45% fine to coarse sand.		
12.5		100					
15.0							

**Backfill**  
Top: 0 ft bgs  
Bottom: 26 ft bgs

**Well Casing**  
Type: Schedule  
40 PVC  
Diameter: 2 in  
Top: 0 ft bgs  
Bottom: 40 ft bgs

**CLIENT** ARNG, USACE Baltimore District

**PROJECT NAME** Fort William Henry Harrison

**PROJECT NUMBER** 60552172

**SITE NAME** AOI 1

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ENVIRONMENTAL DATA	WELL DIAGRAM
15.0			SC		15.0 Clayey Sand with Gravel (SC), moist, brown, fine to medium grained, poorly graded, 15-25% clay, 15-25% fine to medium angular gravel.		
17.5		92					
20.0			SC		20.0 Clayey Sand (SC), moist, dark gray, fine grained, gap graded, 15-25% clay, 5-10% coarse sand, 5-10% coarse to very coarse gravel, <5% cobble.		
22.5		100					
25.0			SC		25.0 Changes to brown, well graded, 10-15% medium to coarse sand, 5-10% fine to very coarse gravel.		
27.5		100					
30.0			ML		30.0 Silt with Sand (ML), moist to wet, brown, 15-25% fine sand, 5-10% fine to very coarse gravel.		

AOI1-SB2-15-17

AOI1-SB2-28-30

**Well Casing**  
Type: Schedule 40 PVC  
Diameter: 2 in  
Top: 0 ft bgs  
Bottom: 40 ft bgs

**Well Seal**  
Type: Bentonite Medium Chip  
Top: 26 ft bgs  
Bottom: 28 ft bgs

**Filter Pack**  
Type: #2 Filter Sand  
Top: 28 ft bgs  
Bottom: 40 ft bgs

ARNG SMART LOG 8.5X11 - CINTAS LAUREL.GPJ - 7/3/19 13:12 - Q:\PROJECTS\ENV\GEO\ARNG PFAS\900-CAD-GIS\930-OTHER\GINT\FTWHH.GPJ



(Continued Next Page)

CLIENT ARNG, USACE Baltimore District

PROJECT NAME Fort William Henry Harrison

PROJECT NUMBER 60552172

SITE NAME AOI 1

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ENVIRONMENTAL DATA	WELL DIAGRAM
32.5		100	ML		30.0 Silt with Sand (ML), moist to wet, brown, 15-25% fine sand, 5-10% fine to very coarse gravel. (continued)		
35.0			GW		35.0 Well-Graded Gravel with Silt and Sand (GW), wet, brown, fine to very coarse grained, angular, well graded, 15-25% fine to coarse sand, 5-10% silt.	AOI1-MW2-35-37	
37.5		98					
40.0							

Bottom of borehole at 40.0 feet.

**Notes:**




- Headspace screening values represent total volatile organic vapors (referenced to an isobutylene standard) measured with a Photoionization Detector (PID) with 10.6 eV lamp.
- Coordinates and elevation data in NAVD88 for vertical datum and NAD83/91 for horizontal datum in Montana State Plane.

**Well Casing**  
Type: Schedule  
40 PVC  
Diameter: 2 in  
Top: 0 ft bgs  
Bottom: 40 ft bgs

**Well Screen**  
Type: Schedule  
40 PVC  
Slot Size: 0.01 in  
Top: 30 ft bgs  
Bottom: 40 ft bgs

**Well Screen**  
Type: Schedule  
40 PVC  
Slot Size: 0.01 in  
Top: 30 ft bgs  
Bottom: 40 ft bgs

<b>CLIENT</b> <u>ARNG, USACE Baltimore District</u>	<b>PROJECT NAME</b> <u>Fort William Henry Harrison</u>
<b>PROJECT NUMBER</b> <u>60552172</u>	<b>SITE NAME</b> <u>AOI 1</u>
<b>DATE STARTED</b> <u>2/18/19</u> <b>COMPLETED</b> <u>2/20/19</u>	<b>EASTING</b> <u>N/A</u> <b>NORTHING</b> <u>N/A</u>
<b>DRILLING CONTRACTOR</b> <u>Cascade</u>	<b>GROUND ELEVATION</b> <u>N/A</u> <b>HOLE SIZE</b> <u>6 inches</u>
<b>DRILLING EQUIPMENT</b> <u>MiniSonic LS250</u>	<b>GROUND WATER LEVELS:</b>
<b>DRILLING METHOD</b> <u>Roto Sonic</u>	<b>AT TIME OF DRILLING</b> <u>---</u>
<b>LOGGED BY</b> <u>C. Beza</u> <b>CHECKED BY</b> <u>K. ODonnell</u>	<b>AT END OF DRILLING</b> <u>---</u>

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ENVIRONMENTAL DATA	WELL DIAGRAM
0.0					0.0 No Recovery	<b>AOI1-SS3-0-2</b>	<b>Backfill</b> Top: 0 ft bgs Bottom: 36 ft bgs
2.5		83	SP		2.0 Poorly-Graded Sand with Gravel (SP), moist, dark brown, fine grained, gap graded, 15-25% fine to medium gravel.		
5.0		92	SM		5.0 Silty Sand (SM), moist, brown, fine to medium grained, poorly graded, 15-25% silt, 5-10% fine gravel, <5% coarse sand.		
10.0		85	GW		10.0 Sandy Gravel (GW), moist, brown, fine to very coarse grained, subrounded, well graded, 30-45% fine to coarse sand.		
12.5							<b>Well Casing</b> Type: Schedule 40 PVC Diameter: 2 in Top: 0 ft bgs Bottom: 50 ft bgs
15.0							

ARNG SMART LOG 8.5X11 - CINTAS LAUREL.GPJ - 7/3/19 13:12 - Q:\PROJECTS\ENV\GEARS\GEO\ARNG PFAS\900-CAD-GIS\930-OTHER\GINT\FTWHH.GPJ







**CLIENT** ARNG, USACE Baltimore District

**PROJECT NAME** Fort William Henry Harrison

**PROJECT NUMBER** 60552172

**SITE NAME** AOI 1

ARNG SMART LOG 8.5X11 - CINTAS LAUREL.GPJ - 7/3/19 13:12 - Q:\PROJECTS\ENV\GEARS\GEO\ARNG PFAS\900-CAD-GIS\930-OTHER\GINT\FTWHH.GPJ

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ENVIRONMENTAL DATA	WELL DIAGRAM
15.0							
17.5		98	GW		10.0 Sandy Gravel (GW), moist, brown, fine to very coarse grained, subrounded, well graded, 30-45% fine to coarse sand. <i>(continued)</i> Changes to subangular. 15.0	<div>AOI1-SB3-18-20</div> <div>AOI1-SB3-18-20-DUP</div>	
20.0			GW		20.0 Changes to dry, coarse to very coarse grained, angular to subrounded, poorly graded.		
22.5		90					
25.0			SC		25.0 Clayey Sand (SC), moist, brown, fine grained, poorly graded, 15-25% clay, 5-10% fine angular to subrounded gravel.		<b>Well Casing</b> Type: Schedule 40 PVC Diameter: 2 in Top: 0 ft bgs Bottom: 50 ft bgs
27.5		87					
30.0							
					30.0 Changes to moist to wet, 5-10% fine to very coarse angular to subrounded gravel.		

(Continued Next Page)

**CLIENT** ARNG, USACE Baltimore District

**PROJECT NAME** Fort William Henry Harrison

**PROJECT NUMBER** 60552172

**SITE NAME** AOI 1

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ENVIRONMENTAL DATA	WELL DIAGRAM
32.5		62	SC		25.0 Clayey Sand (SC), moist, brown, fine grained, poorly graded, 15-25% clay, 5-10% fine angular to subrounded gravel. <i>(continued)</i>		
35.0					35.0 Changes to fine to medium grained, 5-10% fine angular to subrounded gravel.		
37.5		68					
40.0					40.0 Changes to wet, fine to coarse grained, well graded, 5-10% fine angular gravel.		
42.5		100					
45.0							
47.5		100	SW-SM		45.0 Well-Graded Sand with Silt (SW-SM), wet, dark brown, fine to coarse grained, well graded, 5-10% fine to coarse angular gravel, 5-10% silt.		

**Well Seal**  
Type: Bentonite  
Medium Chip  
Top: 36 ft bgs  
Bottom: 38 ft bgs

**Filter Pack**  
Type: #2 Filter  
Sand  
Top: 38 ft bgs  
Bottom: 50 ft bgs

**Well Casing**  
Type: Schedule  
40 PVC  
Diameter: 2 in  
Top: 0 ft bgs  
Bottom: 50 ft bgs

**Well Screen**  
Type: Schedule  
40 PVC  
Slot Size: 0.01 in  
Top: 40 ft bgs  
Bottom: 50 ft bgs



AOI1-SB3-38-40

AOI1-MW3-47-48

ARNG SMART LOG 8.5X11 - CINTAS LAUREL.GPJ - 7/3/19 13:12 - Q:\PROJECTS\ENV\GEOARS\GEO\ARNG PFAS\900-CAD-GIS\930-OTHER\GINT\FTWHH.GPJ

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**CLIENT** ARNG, USACE Baltimore District **PROJECT NAME** Fort William Henry Harrison  
**PROJECT NUMBER** 60552172 **SITE NAME** AOI 1

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ENVIRONMENTAL DATA	WELL DIAGRAM
50.0			SW-SM		45.0		

Bottom of borehole at 50.0 feet.

**Notes:**

1. Headspace screening values represent total volatile organic vapors (referenced to an isobutylene standard) measured with a Photoionization Detector (PID) with 10.6 eV lamp.
2. Coordinates and elevation data in NAVD88 for vertical datum and NAD83/91 for horizontal datum in Montana State Plane.

<b>CLIENT</b> <u>ARNG, USACE Baltimore District</u>	<b>PROJECT NAME</b> <u>Fort William Henry Harrison</u>
<b>PROJECT NUMBER</b> <u>60552172</u>	<b>SITE NAME</b> <u>AOI 2</u>
<b>DATE STARTED</b> <u>5/21/19</u> <b>COMPLETED</b> <u>5/21/19</u>	<b>EASTING</b> <u>N/A</u> <b>NORTHING</b> <u>N/A</u>
<b>DRILLING CONTRACTOR</b> <u>Cascade</u>	<b>GROUND ELEVATION</b> <u>N/A</u> <b>HOLE SIZE</b> <u>6 inches</u>
<b>DRILLING EQUIPMENT</b> <u>MiniSonic LS250</u>	<b>GROUND WATER LEVELS:</b>
<b>DRILLING METHOD</b> <u>Roto Sonic</u>	<b>AT TIME OF DRILLING</b> <u>---</u>
<b>LOGGED BY</b> <u>C. Beza</u> <b>CHECKED BY</b> <u>K. ODonnell</u>	<b>AT END OF DRILLING</b> <u>---</u>

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ENVIRONMENTAL DATA	WELL DIAGRAM
0.0			SM		0.0 Silty Sand (SM), dry to moist, dark brown, fine grained, gap graded, 15-25% silt, 5-10% fine to coarse angular to subrounded gravel.		
2.5						AOI2-SB1-0-2	
5.0		95					
7.5			SM		6.0 Changes to light brown. 10-15% fine to coarse angular to subrounded gravel.		
10.0							
12.5			SM		10.0 Changes to brown to light brown, 5-10% medium to very coarse subangular to subrounded gravel.	AOI2-SB1-9-11	
15.0							

**Backfill**  
Top: 0 ft bgs  
Bottom: 24 ft bgs

**Well Casing**  
Type: Schedule  
40 PVC  
Diameter: 2 in  
Top: 0 ft bgs  
Bottom: 38 ft bgs



**CLIENT** ARNG, USACE Baltimore District

**PROJECT NAME** Fort William Henry Harrison

**PROJECT NUMBER** 60552172

**SITE NAME** AOI 2

ARNG SMART LOG 8.5X11 - CINTAS LAUREL.GPJ - 7/3/19 13:12 - Q:\PROJECTS\ENV\GEARS\GEO\ARNG PFAS\900-CAD-GIS\930-OTHER\GINT\FTWHH.GPJ

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ENVIRONMENTAL DATA	WELL DIAGRAM
15.0		97	SM		10.0 Changes to brown to light brown, 5-10% medium to very coarse subangular to subrounded gravel. <i>(continued)</i>		
17.5							
20.0			SC-SM		18.0 Silty, Clayey Sand (SC-SM), moist to wet, light brown, fine grained, gap graded, 10-15% clay, 5-10% silt, 5-10% medium to very coarse subangular to subrounded gravel.	AOI2-SB1-18-20	
22.5			SC		19.7 Clayey Sand (SC), wet, dark brown, fine to coarse grained, well graded, 15-25% clay, gradational lower boundary.		
25.0		100					
27.5			SW		26.0 Well-Graded Sand with Gravel (SW), wet, gray to light gray, fine to coarse grained, gap graded, 15-25% coarse to very coarse angular to subrounded gravel.		
30.0			SC		30.0 Clayey Sand (SC), wet, dark brown, fine to coarse grained, well graded, 15-25% clay, 10-15% fine to coarse angular gravel.	AOI2-MW1-28-30	

**Well Casing**  
Type: Schedule 40 PVC  
Diameter: 2 in  
Top: 0 ft bgs  
Bottom: 38 ft bgs

**Annular Seal**  
Type: Portland Cement  
Top: 24 ft bgs  
Bottom: 26 ft bgs

**Filter Pack**  
Type: #2 Filter Sand  
Top: 26 ft bgs  
Bottom: 39 ft bgs

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**CLIENT** ARNG, USACE Baltimore District

**PROJECT NAME** Fort William Henry Harrison

**PROJECT NUMBER** 60552172

**SITE NAME** AOI 2

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ENVIRONMENTAL DATA	WELL DIAGRAM
32.5			SC		30.0 Clayey Sand (SC), wet, dark brown, fine to coarse grained, well graded, 15-25% clay, 10-15% fine to coarse angular gravel. <i>(continued)</i>		
35.0		100					
37.5							

**Well Casing**  
Type: Schedule  
40 PVC  
Diameter: 2 in  
Top: 0 ft bgs  
Bottom: 38 ft bgs

**Well Screen**  
Type: Schedule  
40 PVC  
Slot Size: 0.01 in  
Top: 28 ft bgs  
Bottom: 38 ft bgs

**Well Screen**  
Type: Schedule  
40 PVC  
Slot Size: 0.01 in  
Top: 28 ft bgs  
Bottom: 38 ft bgs

Bottom of borehole at 39.0 feet.

**Notes:**

3. Headspace screening values represent total volatile organic vapors (referenced to an isobutylene standard) measured with a Photoionization Detector (PID) with 10.6 eV lamp.
4. Coordinates and elevation data in NAVD88 for vertical datum and NAD83/91 for horizontal datum in Montana State Plane.

<b>CLIENT</b> ARNG, USACE Baltimore District	<b>PROJECT NAME</b> Fort William Henry Harrison
<b>PROJECT NUMBER</b> 60552172	<b>SITE NAME</b> AOI 2
<b>DATE STARTED</b> 5/23/19 <b>COMPLETED</b> 5/23/19	<b>EASTING</b> N/A <b>NORTHING</b> N/A
<b>DRILLING CONTRACTOR</b> Cascade	<b>GROUND ELEVATION</b> N/A <b>HOLE SIZE</b> N/A
<b>DRILLING EQUIPMENT</b> MiniSonic LS250	<b>GROUND WATER LEVELS:</b>
<b>DRILLING METHOD</b> Roto Sonic	<b>AT TIME OF DRILLING</b> ---
<b>LOGGED BY</b> C. Beza <b>CHECKED BY</b> K. ODonnell	<b>AT END OF DRILLING</b> ---

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ENVIRONMENTAL DATA	WELL DIAGRAM
0.0			SC		0.0 Clayey Sand with Gravel (SC), dry, black, fine grained, gap graded, 15-25% clay, 15-25% fine to coarse angular gravel.	AOI2-SB2-0-2	
2.5			SM		2.0 Silty Sand (SM), dry, grayish brown, fine grained, gap graded, 15-25% silt, 10-15% fine to coarse angular gravel.	AOI2-SB2-0-2-DUP	
5.0		100	SM		5.0 Changes to reddish brown, 10-15% fine to very coarse subrounded gravel. 5.1 12-inch layer containing subrounded cobbles.		
7.5							
10.0						AOI2-SB2-8-10	
12.5					12.5 Contains black discoloration.		
15.0							

**Backfill**  
Top: 0 ft bgs  
Bottom: 16 ft bgs


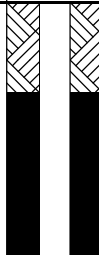
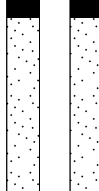

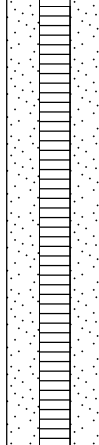
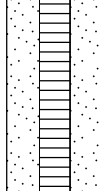

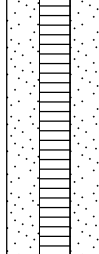


**Well Casing**  
Type: Schedule 40 PVC  
Diameter: 2 in  
Top: 0 ft bgs  
Bottom: 30 ft bgs

**CLIENT** ARNG, USACE Baltimore District

**PROJECT NAME** Fort William Henry Harrison

**PROJECT NUMBER** 60552172

**SITE NAME** AOI 2

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ENVIRONMENTAL DATA	WELL DIAGRAM
15.0		100	SP-SM		15.0 Poorly-Graded Sand with Silt and Gravel (SP-SM), moist, brown, fine grained, gap graded, 15-25% fine to very coarse subrounded gravel, 5-10% silt.		
17.5					18.0 Changes to wet.	AOI2-SB2-18-20	
20.0			SC		20.0 Clayey Sand with Gravel (SC), wet, dark brown, fine to medium grained, gap graded, 15-25% clay, 15-25% medium to very coarse subrounded gravel.		
22.5							
25.0		100	SC		25.0 Changes to reddish brown.	AOI2-MW2-24-26	
27.5			SP		27.0 Poorly-Graded Sand with Gravel (SP), wet, dark brown, fine to medium grained, gap graded, 15-25% fine to coarse gravel.		
30.0							

Bottom of borehole at 30.0 feet.

**Notes:**

3. Headspace screening values represent total volatile organic vapors (referenced to an isobutylene standard) measured with a Photoionization Detector (PID) with 10.6 eV lamp.
4. Coordinates and elevation data in NAVD88 for vertical datum and NAD83/91 for horizontal datum in Montana State Plane.



<b>CLIENT</b> <u>ARNG, USACE Baltimore District</u>	<b>PROJECT NAME</b> <u>Fort William Henry Harrison</u>
<b>PROJECT NUMBER</b> <u>60552172</u>	<b>SITE NAME</b> <u>AOI 3</u>
<b>DATE STARTED</b> <u>5/21/19</u> <b>COMPLETED</b> <u>5/22/19</u>	<b>EASTING</b> <u>N/A</u> <b>NORTHING</b> <u>N/A</u>
<b>DRILLING CONTRACTOR</b> <u>Cascade</u>	<b>GROUND ELEVATION</b> <u>N/A</u> <b>HOLE SIZE</b> <u>6 inches</u>
<b>DRILLING EQUIPMENT</b> <u>MiniSonic LS250</u>	<b>GROUND WATER LEVELS:</b>
<b>DRILLING METHOD</b> <u>Roto Sonic</u>	<b>AT TIME OF DRILLING</b> <u>---</u>
<b>LOGGED BY</b> <u>C. Beza</u> <b>CHECKED BY</b> <u>K. ODonnell</u>	<b>AT END OF DRILLING</b> <u>---</u>

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ENVIRONMENTAL DATA	WELL DIAGRAM
0.0							
2.5							
5.0		50	SM		0.0 Silty Sand (SM), dry, brown, fine grained, poorly graded, 15-25% silt, 5-10% fine to coarse angular gravel.	AOI3-SB1-0-2	<b>Backfill</b> Top: 0 ft bgs Bottom: 44 ft bgs
7.5							
10.0							
12.5					10.0 Changes to fine to medium grained, 5-10% fine to very coarse subangular to subrounded gravel.		<b>Well Casing</b> Type: Schedule 40 PVC Diameter: 2 in Top: 0 ft bgs Bottom: 58 ft bgs
15.0							

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**CLIENT** ARNG, USACE Baltimore District

**PROJECT NAME** Fort William Henry Harrison

**PROJECT NUMBER** 60552172

**SITE NAME** AOI 3

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ENVIRONMENTAL DATA	WELL DIAGRAM
15.0		100	SM	0.0	Silty Sand (SM), dry, brown, fine grained, poorly graded, 15-25% silt, 5-10% fine to coarse angular gravel. (continued)		
17.5							
20.0							
22.5			SP-SC	20.0	Poorly-Graded Sand with Silty Clay (SP-SC), dry, brown, fine to medium grained, 10-15% clay, 5-10% silt, 5-10% fine to very coarse subangular to subrounded gravel.		
25.0		100	SM	23.0	Silty Sand (SM), dry, brown, fine to medium grained, poorly graded, 15-25% silt, 5-10% fine to coarse angular gravel.		
27.5			SP-SC	26.0	Poorly-Graded Sand with Silty Clay and Gravel (SP-SC), dry to moist, brown, fine to medium grained,		
30.0			SM	29.0	Silty Sand with Gravel (SM), dry to moist, dark brown, fine to coarse grained, well graded, 15-25% silt, 15-25% fine to very coarse subangular to subrounded gravel.		
			SM	31.0	Changes to reddish brown.		

AOI3-SB1-18-20

**Well Casing**  
 Type: Schedule  
 40 PVC  
 Diameter: 2 in  
 Top: 0 ft bgs  
 Bottom: 58 ft bgs

(Continued Next Page)

**CLIENT** ARNG, USACE Baltimore District

**PROJECT NAME** Fort William Henry Harrison

**PROJECT NUMBER** 60552172

**SITE NAME** AOI 3

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ENVIRONMENTAL DATA	WELL DIAGRAM
32.5			SM		31.0 Changes to reddish brown. <i>(continued)</i>		
35.0		100	SM		34.0 Changes to brown.		
37.5							
40.0			CL-ML		39.5 Silty Clay (CL-ML), moist to wet, yellowish brown, <5% fine sand.		
42.5							
45.0		100	MH		43.5 Elastic Silt (MH), moist to wet, white, <5% fine sand.		
47.5							

AOI3-SB1-40-42

**Well Casing**  
Type: Schedule 40 PVC  
Diameter: 2 in  
Top: 0 ft bgs  
Bottom: 58 ft bgs

**Annular Seal**  
Type: Portland Cement  
Top: 44 ft bgs  
Bottom: 46 ft bgs

**Filter Pack**  
Type: #2 Filter Sand  
Top: 46 ft bgs  
Bottom: 58 ft bgs

AOI3-MW1-47-48

ARNG SMART LOG 8.5X11 - CINTAS LAUREL.GPJ - 7/3/19 13:12 - Q:\PROJECTS\ENV\GEOARS\GEO\ARNG PFAS\900-CAD-GIS\930-OTHER\GINT\FTWHH.GPJ

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**CLIENT** ARNG, USACE Baltimore District

**PROJECT NAME** Fort William Henry Harrison

**PROJECT NUMBER** 60552172

**SITE NAME** AOI 3

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ENVIRONMENTAL DATA	WELL DIAGRAM
50.0			MH		43.5 Elastic Silt (MH), moist to wet, white, <5% fine sand. (continued)		
					50.0 Changes to wet.		
52.5		100					
55.0							
57.5							

**Well Casing**  
Type: Schedule  
40 PVC  
Diameter: 2 in  
Top: 0 ft bgs  
Bottom: 58 ft bgs

**Well Screen**  
Type: Schedule  
40 PVC  
Slot Size: 0.01 in  
Top: 48 ft bgs  
Bottom: 58 ft bgs

Bottom of borehole at 58.0 feet.

**Notes:**

5. Headspace screening values represent total volatile organic vapors (referenced to an isobutylene standard) measured with a Photoionization Detector (PID) with 10.6 eV lamp.
6. Coordinates and elevation data in NAVD88 for vertical datum and NAD83/91 for horizontal datum in Montana State Plane.



**CLIENT** ARNG, USACE Baltimore District

**PROJECT NAME** Fort William Henry Harrison

**PROJECT NUMBER** 60552172

**SITE NAME** AOI 1

**DATE STARTED** 10/9/20

**COMPLETED** 10/10/20

**EASTING** 1315327.696

**NORTHING** 875496.685

**DRILLING CONTRACTOR** Cascade

**GROUND ELEVATION** 3975.63 ft

**HOLE SIZE** 4.25 inches

**DRILLING EQUIPMENT** CME 85

**GROUND WATER LEVELS:**
**DRILLING METHOD** Hollow Stem Auger










**AT TIME OF DRILLING** 30.00 ft / Elev 3945.63 ft

**LOGGED BY** C. Beza

**CHECKED BY** J. Hollingsworth

**AT TIME OF SAMPLING** 29.56 ft / Elev 3946.07 ft

ARNG SMART LOG 8.5X11\_V2 - 10/30/20 16:19 - C:\USERS\JACK.HOLLINGSWORTH\DOCUMENTS\GINT\ARNG\MT\FWH\HFTW\H.GPJ

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ENVIRONMENTAL DATA	WELL DIAGRAM
0								
				GW-GM		0.0 WELL-GRADED GRAVEL WITH SILT AND SAND, dry, pale brown. 3975.6	AOI01-04-SB-00-02	 <b>Annular Seal</b> Type: Portland Cement Top: 0 ft bgs Bottom: 3 ft bgs
						2.0 NOT SAMPLED. 3973.6		
5	SS	100	50/5"	SM		5.0 SILTY SAND, dry, pale brown (10YR 6/3), fine-grained with 15-25% silt and 10-15% medium, angular gravel. 3970.6		 <b>Annular Seal</b> Type: Portland Cement Top: 3 ft bgs Bottom: 25 ft bgs
						6.5 NOT SAMPLED. 3969.1		
10	SS	100	19-30-42 (72)	SW		10.0 WELL-GRADED SAND, dry, light yellowish brown (10YR 6/4), fine- to medium-grained with medium, angular gravel ranging up to 1 inch in diameter. 3965.6		 <b>Well Casing</b> Type: Schedule 40 PVC Diameter: 2 in Top: 0 ft bgs Bottom: 28 ft bgs
						11.5 NOT SAMPLED. 3964.1		
15	SS	100	9-18-26 (44)			15.0 WELL-GRADED SAND WITH GRAVEL, slightly moist, brown (10YR 5/3), fine- to medium-grained with 15-25% subangular gravel ranging in size from 1/4 to 1 inch in diameter. 3960.6	AOI01-04-SB-15-17	
						16.5 NOT SAMPLED. 3959.1		
20	SS	100	10-25-45 (70)			20.0 WELL-GRADED SAND WITH GRAVEL, slightly moist, brown (10YR 5/3), fine- to coarse-grained with 30-35% subangular gravel ranging up to 2 inches in diameter and small amounts of clay. 3955.6		
						21.5 NOT SAMPLED. 3954.1		
25								 <b>Filter Pack</b> Type: #00 Filter




(Continued Next Page)

CLIENT ARNG, USACE Baltimore District

PROJECT NAME Fort William Henry Harrison

PROJECT NUMBER 60552172

SITE NAME AOI 1

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ENVIRONMENTAL DATA	WELL DIAGRAM
25								
	SS	100	10-41-49 (90)			25.0 Same as above. 3950.6 25.8 Changes to dry, very pale brown (10YR 7/3) with 35-40% gravel and less clay. 3949.9 26.5 NOT SAMPLED. 3949.1		
30	SS	100	9-12-21 (33)	SC		30.0 CLAYEY SAND, very moist, yellowish brown (10YR 5/4), fine- to medium-grained with >15% clay. 3945.6 31.5 NOT SAMPLED. 3944.1	AOI01-04-SB-30-32	
35	SS	100	5-10-23 (33)			35.0 Same as above. Changes to saturated wet. 3940.6 36.5 NOT SAMPLED. 3939.1	AOI01-MW04-GW	

Bottom of borehole at 38.0 feet.

**Notes:**

1. Headspace screening values represent total volatile organic vapors (referenced to an isobutylene standard) measured with a Photoionization Detector (PID) with 10.6 eV lamp.
2. Coordinates and elevation data in NAVD88 for vertical datum and NAD83/91 for horizontal datum in Montana State Plane.
3. First 5 feet cleared with air knife.

**CLIENT** ARNG, USACE Baltimore District

**PROJECT NAME** Fort William Henry Harrison

**PROJECT NUMBER** 60552172

**SITE NAME** AOI 1

**DATE STARTED** 10/8/20

**COMPLETED** 10/9/20

**EASTING** 1317100.063

**NORTHING** 875592.893

**DRILLING CONTRACTOR** Cascade

**GROUND ELEVATION** 3947.99 ft

**HOLE SIZE** 4.25 inches

**DRILLING EQUIPMENT** CME 85

**GROUND WATER LEVELS:**
**DRILLING METHOD** Hollow Stem Auger






**▽ AT TIME OF DRILLING** 37.00 ft / Elev 3910.99 ft

**LOGGED BY** C. Beza

**CHECKED BY** J. Hollingsworth

**▼ AT TIME OF SAMPLING** 34.21 ft / Elev 3913.78 ft

ARNG SMART LOG 8.5X11\_V2 - 10/30/20 16:19 - C:\USERS\JACK.HOLLINGSWORTH\DOCUMENTS\GINT\ARNG\MT\FWH\HFTW\H.GPJ

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ENVIRONMENTAL DATA	WELL DIAGRAM
0								
				GW		0.0 WELL-GRADED GRAVEL WITH SAND, dry, pale, medium to coarse, angular with 35-45% very fine-grained sand. 3948.0	AOI01-05-SB-00-02	<b>Annular Seal</b> Type: Portland Cement Top: 0 ft bgs Bottom: 3 ft bgs
						2.0 NOT SAMPLED. 3946.0		
5				SW		5.0 WELL-GRADED SAND WITH GRAVEL, dry, gray to tan, fine-grained with 30-50% subrounded to angular gravel. 3943.0		<b>Annular Seal</b> Type: Portland Cement Top: 3 ft bgs Bottom: 33 ft bgs
						6.5 NOT SAMPLED. 3941.5		
10						10.0 WELL-GRADED SAND WITH GRAVEL, dry, gray to tan, fine- to medium-grained with 20-30% subangular gravel and trace silt. 3938.0		
						11.5 NOT SAMPLED. 3936.5		
15						15.0 Same as above. 3933.0	AOI01-05-SB-15-17	
						16.5 NOT SAMPLED. 3931.5		
20						20.0 WELL-GRADED SAND WITH GRAVEL, dry, light brown (7.5YR 6/3), fine- to medium-grained (with 10% coarse-grained) with 15% fine to coarse, subangular to subrounded gravel. 3928.0		
						21.5 NOT SAMPLED. 3926.5		
25								

**Well Casing**  
 Type: Schedule 40 PVC  
 Diameter: 2 in  
 Top: 0 ft bgs  
 Bottom: 35 ft bgs

(Continued Next Page)

**CLIENT** ARNG, USACE Baltimore District

**PROJECT NAME** Fort William Henry Harrison

**PROJECT NUMBER** 60552172

**SITE NAME** AOI 1

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ENVIRONMENTAL DATA	WELL DIAGRAM
25								
	SS	100	17-33-34 (67)			25.0 WELL-GRADED SAND WITH GRAVEL, moist, light brown (7.5YR 6/3), fine- to coarse-grained with 15-25% fine to coarse, angular to subangular gravel and 5-10% silt. / 3923.0 26.5 NOT SAMPLED. / 3921.5		
30	SS	81	8-50/2"	SW-SM		30.0 WELL-GRADED SAND WITH SILT AND GRAVEL, slightly moist, light brown (7.5YR 6/3), fine- to coarse-grained with 35%-50% gravel and 10% moderately stiff silt. / 3918.0 31.5 NOT SAMPLED. / 3916.5	AOI01-05-SB-30-32	
35	SS	92	13-37-32 (69)			35.0 WELL-GRADED SAND WITH SILT AND GRAVEL, moist, light brown (7.5YR 6/3), fine- to coarse-grained with 15-25% gravel and 10% silt. / 3913.0 36.5 NOT SAMPLED. / 3911.5		
40	SS	56		SW		40.0 WELL-GRADED SAND, wet, light brown (7.5YR 6/3), fine- to coarse-grained with 10% fine, subangular to subrounded gravel and 5-10% silt. / 3908.0 41.5 NOT SAMPLED. / 3906.5	AOI01-MW05-GW	
45								

**Well Casing**  
Type: Schedule 40 PVC  
Diameter: 2 in  
Top: 0 ft bgs  
Bottom: 35 ft bgs

**Filter Pack**  
Type: #00 Filter Sand  
Top: 33 ft bgs  
Bottom: 45 ft bgs

**Well Screen**  
Type: Schedule 40 PVC  
Slot Size: 0.01 in  
Top: 35 ft bgs  
Bottom: 45 ft bgs

Bottom of borehole at 45.0 feet.

**Notes:**

1. Headspace screening values represent total volatile organic vapors (referenced to an isobutylene standard) measured with a Photoionization Detector (PID) with 10.6 eV lamp.
2. Coordinates and elevation data in NAVD88 for vertical datum and NAD83/91 for horizontal datum in Montana State Plane.
3. First 5 feet cleared with air knife.



**CLIENT** ARNG, USACE Baltimore District

**PROJECT NAME** Fort William Henry Harrison

**PROJECT NUMBER** 60552172

**SITE NAME** AOI 1

**DATE STARTED** 10/9/20 **COMPLETED** 10/9/20

**EASTING** 1317096.927 **NORTHING** 875975.687

**DRILLING CONTRACTOR** Cascade

**GROUND ELEVATION** 3948.43 ft **HOLE SIZE** 4.25 inches

**DRILLING EQUIPMENT** CME 85








**GROUND WATER LEVELS:**
**DRILLING METHOD** Hollow Stem Auger

**▽ AT TIME OF DRILLING** 31.00 ft / Elev 3917.43 ft

**LOGGED BY** J. Hollingsworth **CHECKED BY** C. Beza

**▼ AT TIME OF SAMPLING** 30.16 ft / Elev 3918.27 ft

ARNG SMART LOG 8.5X11\_V2 - 10/30/20 16:19 - C:\USERS\JACK.HOLLINGSWORTH\DOCUMENTS\GINT\ARNG\MT\FWH\HFTW\H.GPJ

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ENVIRONMENTAL DATA	WELL DIAGRAM
0								
				GW		0.0 WELL-GRADED GRAVEL WITH SAND, 3948.4 dry, pale, medium to coarse, angular with 35-45% very fine-grained sand. 1.0 Black coal present. 3947.4	AOI01-06-SB-00-02	
						2.0 NOT SAMPLED. 3946.4		
5	SS	56	35-13-10 (23)	SW		5.0 WELL-GRADED SAND WITH GRAVEL, 3943.4 dry, light brownish gray (10YR 6/2), fine- to coarse-grained (mostly fine) with 15% 6.5 fine to medium gravel and 5% silt. 3941.9 NOT SAMPLED.		
10	SS	69	28-31-40 (71)			10.0 Same as above. Silt 5-10%. 3938.4 11.5 NOT SAMPLED. 3936.9	AOI01-06-SB-15-17	
15	SS	92	21-47-42 (89)			15.0 WELL-GRADED SAND, moist, very fine- 3933.4 to coarse-grained (mostly very fine), with 16.0 10% fine to medium gravel and 5-10% 3932.4 silt. 3931.9		
20	SS	88	25-32- 50/5"			16.5 WELL-GRADED SAND WITH GRAVEL, 3931.9 moist, very pale brown (10YR 7/4), very fine- to coarse-grained with 30-45% angular, fine to coarse gravel ranging up to 2 inches in diameter and 5-10% silt. Grades into fine- to coarse-grained sand (mostly fine) with 10% fine to medium gravel and 5-10% silt. 3928.4 20.0 NOT SAMPLED. 3928.4 21.5 WELL-GRADED SAND WITH GRAVEL, 3926.9 slightly moist, pinkish gray (7.5YR 6/2), fine- to coarse-grained with 25% fine to coarse, subrounded to angular gravel. NOT SAMPLED.		
25								

**Annular Seal**  
 Type: Portland  
 Cement  
 Top: 0 ft bgs  
 Bottom: 3 ft bgs

**Annular Seal**  
 Type: Portland  
 Cement  
 Top: 3 ft bgs  
 Bottom: 25 ft bgs

**Well Casing**  
 Type: Schedule 40  
 PVC  
 Diameter: 2 in  
 Top: 0 ft bgs  
 Bottom: 27 ft bgs

**Filter Pack**  
 Type: #00 Filter




(Continued Next Page)

**CLIENT** ARNG, USACE Baltimore District

**PROJECT NAME** Fort William Henry Harrison

**PROJECT NUMBER** 60552172

**SITE NAME** AOI 1

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ENVIRONMENTAL DATA	WELL DIAGRAM
25								
	SS	94	22-25-35 (60)	SM SW		25.0 SILTY SAND WITH GRAVEL, moist, dark yellowish brown (10YR 4/4), fine- to coarse-grained, slightly cohesive with 15% silt and 25% fine to coarse, subangular to subrounded gravel ranging up to 1.5 inches in diameter. 3923.4 25.5 3922.9 26.5 3921.9		
						WELL-GRADED SAND WITH GRAVEL, moist, dark yellowish brown, fine- to coarse-grained with 30-45% fine to coarse, angular to subrounded gravel and 5% silt.		
30								
	SS	78	44-45-35 (80)	SM SW		30.0 NOT SAMPLED. 3918.4 30.5 SILTY SAND, moist, yellowish brown (10YR 5/4), fine- to coarse-grained with 15-25% silt and 5% fine gravel. 3917.9 30.8 3917.6 31.5 Four inches of gravel, fine to coarse ranging up to 2 inches in diameter. 3916.9	AOI01-06-SB-30-32	
						WELL-GRADED SAND WITH GRAVEL, wet, pale brown (10YR 6/3), fine- to coarse-grained with 30-45% fine to coarse gravel ranging up to 2 inches in diameter and 5-10% silt.	AOI01-MW06-GW	
35								
	SS	100	1-8-41 (49)			35.0 NOT SAMPLED. 3913.4 36.5 WELL-GRADED SAND WITH GRAVEL, wet, pink (7.5YR 7/3), fine- to coarse-grained with 35-45% fine to coarse, subangular to subrounded gravel and 5-10% silt. 3911.9		

**Notes:**

- Headspace screening values represent total volatile organic vapors (referenced to an isobutylene standard) measured with a Photoionization Detector (PID) with 10.6 eV lamp.
- Coordinates and elevation data in NAVD88 for vertical datum and NAD83/91 for horizontal datum in Montana State Plane.
- First 5 feet cleared with air knife.

**CLIENT** ARNG, USACE Baltimore District

**PROJECT NAME** Fort William Henry Harrison

**PROJECT NUMBER** 60552172

**SITE NAME** AOI 2

**DATE STARTED** 10/10/20 **COMPLETED** 10/10/20

**EASTING** 1316453.436 **NORTHING** 876961.658

**DRILLING CONTRACTOR** Cascade

**GROUND ELEVATION** 3953.68 ft **HOLE SIZE** 4.25 inches

**DRILLING EQUIPMENT** CME 85









**GROUND WATER LEVELS:**
**DRILLING METHOD** Hollow Stem Auger

**AT TIME OF DRILLING** 35.00 ft / Elev 3918.68 ft

**LOGGED BY** C. Beza **CHECKED BY** J. Hollingsworth

**AT TIME OF SAMPLING** 24.54 ft / Elev 3929.14 ft

ARNG SMART LOG 8.5X11\_V2 - 10/30/20 16:19 - C:\USERS\JACK.HOLLINGSWORTH\DOCUMENTS\GINT\ARNG\MT\FWH\FTWHH.GPJ

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ENVIRONMENTAL DATA	WELL DIAGRAM
0								
				GW		0.0 WELL-GRADED GRAVEL WITH SAND AND COBBLES, dry, brown (7.5YR 4/3) with >15% fine-grained sand and cobbles. 3953.7	AOI02-03-SB-00-02	 <b>Annular Seal</b> Type: Portland Cement Top: 0 ft bgs Bottom: 3 ft bgs
						2.0 NOT SAMPLED. 3951.7		
5				ML		5.0 SILT WITH SAND, slightly moist, grayish brown (10YR 5/2), with 15-25% fine- to medium-grained sand. 3948.7	AOI02-03-SB-10-12	 <b>Annular Seal</b> Type: Portland Cement Top: 3 ft bgs Bottom: 27 ft bgs
	SS	100	7-9-7 (16)			6.5 NOT SAMPLED. 3947.2		
10				SP		10.0 POORLY GRADED SAND, dry, very pale brown (10YR 8/3), fine-grained (little medium-grained) with trace silt. 3943.7		
	SS	100	21-41-45 (86)			11.5 NOT SAMPLED. 3942.2		
15						15.0 Same as above. Changes to 10-15% subangular gravel. 3938.7	AOI02-03-SB-10-12	 <b>Well Casing</b> Type: Schedule 40 PVC Diameter: 2 in Top: 0 ft bgs Bottom: 30 ft bgs
	SS	50	22-50			16.5 NOT SAMPLED. 3937.2		
20						20.0 POORLY GRADED SAND, moist, pale brown (10YR 6/3), fine-grained (little coarse-grained) with trace amounts of silt. 3933.7		
	SS	100	9-47-23 (70)			21.5 NOT SAMPLED. 3932.2		
25								


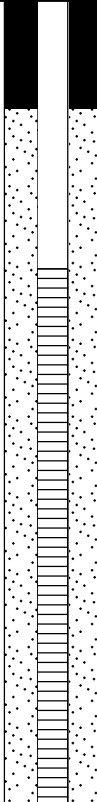


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**CLIENT** ARNG, USACE Baltimore District

**PROJECT NAME** Fort William Henry Harrison

**PROJECT NUMBER** 60552172

**SITE NAME** AOI 2

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ENVIRONMENTAL DATA	WELL DIAGRAM
25	SS	150	10-29-50/0"	SM		25.0 SILTY SAND WITH COBBLES, moist, dark yellowish brown (10YR 4/4), fine- to medium-grained with >15% silt and 10-15% quartzite gravel and cobble chunks broken by spoon ranging up to >3 inches in size. 3928.7 26.5 NOT SAMPLED. 3927.2	AOI02-03-SB-25-27	 <p><b>Filter Pack</b> Type: #00 Filter Sand Top: 27 ft bgs Bottom: 40 ft bgs</p> <p><b>Well Casing</b> Type: Schedule 40 PVC Diameter: 2 in Top: 0 ft bgs Bottom: 30 ft bgs</p> <p><b>Well Screen</b> Type: Schedule 40 PVC Slot Size: 0.01 in Top: 30 ft bgs Bottom: 40 ft bgs</p>
30	SS	100	50/4"			30.0 SILTY SAND WITH GRAVEL, moist to wet, yellowish brown (10YR 5/6), fine- to medium grained with >15% silt and 20-30% angular to subrounded gravel. 3923.7 30.5 3923.2 31.5 Changes to moist. 3922.2 NOT SAMPLED.		
35	SS	100	50/2"	SW		35.0 WELL-GRADED SAND WITH GRAVEL, 3918.7 35.2 saturated wet, yellowish brown (10YR 5/6), fine-grained with >15% coarse gravel. 3918.5 36.5 NO RECOVERY due to spoon refusal. 3917.2 NOT SAMPLED.	AOI02-MW03-GW	
40								

Bottom of borehole at 40.0 feet.

**Notes:**

4. Headspace screening values represent total volatile organic vapors (referenced to an isobutylene standard) measured with a Photoionization Detector (PID) with 10.6 eV lamp.
5. Coordinates and elevation data in NAVD88 for vertical datum and NAD83/91 for horizontal datum in Montana State Plane.
6. First 5 feet cleared with air knife.



**CLIENT** ARNG, USACE Baltimore District

**PROJECT NAME** Fort William Henry Harrison

**PROJECT NUMBER** 60552172

**SITE NAME** AOI 3

**DATE STARTED** 10/7/20

**COMPLETED** 10/8/20

**EASTING** 1314899.271

**NORTHING** 875991.588

**DRILLING CONTRACTOR** Cascade

**GROUND ELEVATION** 3993.62 ft

**HOLE SIZE** 4.25 inches

**DRILLING EQUIPMENT** CME 85

**GROUND WATER LEVELS:**
**DRILLING METHOD** Hollow Stem Auger









**▽ AT TIME OF DRILLING** 50.00 ft / Elev 3943.62 ft

**LOGGED BY** C. Beza

**CHECKED BY** J. Hollingsworth

**▼ AT TIME OF SAMPLING** 47.41 ft / Elev 3946.21 ft

ARNG SMART LOG 8.5X11\_V2 - 10/30/20 16:19 - C:\USERS\JACK.HOLLINGSWORTH\DOCUMENTS\GINT\ARNG\MT\FWH\HFT\WHH.GPJ

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ENVIRONMENTAL DATA	WELL DIAGRAM
0								
				SW		0.0 WELL-GRADED SAND WITH GRAVEL, dry, tan, fine-grained with 15-25% fine, angular gravel. 3993.6	AOI03-02-SB-00-02	 <b>Annular Seal</b> Type: Portland Cement Top: 0 ft bgs Bottom: 3 ft bgs
						2.0 NOT SAMPLED. 3991.6		
5	SS	100	8-8-8 (16)	SW		5.0 WELL-GRADED SAND WITH GRAVEL, dry, gray, fine-grained with 30-45% angular gravel ranging up to 2 inches in diameter. 3988.6		
						6.5 NOT SAMPLED. 3987.1		
10	SS	100	50/5"			10.0 Same as above. 3983.6		 <b>Annular Seal</b> Type: Portland Cement Top: 3 ft bgs Bottom: 48 ft bgs
						11.5 NOT SAMPLED. 3982.1		
15	SS	100	44-50/4"	SM		15.0 SILTY SAND, dry, gray, fine-grained with 30-45% silt and angular gravel present ranging up to 2 inches in diameter. 3978.6		
						16.5 NOT SAMPLED. 3977.1		
20	SS	100	50/5"			20.0 Same as above. 3973.6		 <b>Well Casing</b> Type: Schedule 40 PVC Diameter: 2 in Top: 0 ft bgs Bottom: 50 ft bgs
						21.5 NOT SAMPLED. 3972.1		
25								

(Continued Next Page)

**CLIENT** ARNG, USACE Baltimore District

**PROJECT NAME** Fort William Henry Harrison

**PROJECT NUMBER** 60552172

**SITE NAME** AOI 3

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ENVIRONMENTAL DATA	WELL DIAGRAM
25	SS	225	18-50/2"	SW		25.0 WELL-GRADED SAND, dry, gray, fine-grained with angular gravel ranging up to 1 inch in diameter present. 3968.6		
						26.5 NOT SAMPLED. 3967.1		
30	SS	100	50/4"			30.0 Same as above. Gravel ranges up to 0.5 inches in diameter. 3963.6		
						31.5 NOT SAMPLED. 3962.1		
35	SS	100	37-50/2"			35.0 WELL-GRADED SAND, dry, gray, fine- to medium-grained with angular gravel present ranging up to 1 inch in diameter. 3958.6		
						36.5 NOT SAMPLED. 3957.1		
40	SS	100	50			40.0 WELL-GRADED SAND WITH GRAVEL, dry, gray, fine-grained with 30% angular gravel ranging up to 2 inches in diameter. 3953.6		
						41.5 NOT SAMPLED. 3952.1		
45	SS	100	14-50/4"			45.0 SILTY SAND WITH GRAVEL, slightly moist, gray to orange brown, fine- to medium-grained with >15% silt and 15-20% subangular gravel. Some clay present. 3948.6		
						46.5 NOT SAMPLED. 3947.1		
50	SS	100	5-9-10 (19)	ML		50.0 Same as above. 3943.6		
						50.3 SILT, slightly wet, white to light tan, low plasticity with clay present. 3943.3		
						51.5 NOT SAMPLED. 3942.1		

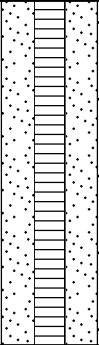
**Well Casing**  
 Type: Schedule 40  
 PVC  
 Diameter: 2 in  
 Top: 0 ft bgs  
 Bottom: 50 ft bgs

**Filter Pack**  
 Type: #00 Filter  
 Sand  
 Top: 48 ft bgs  
 Bottom: 60 ft bgs

**Well Screen**  
 Type: Schedule 40  
 PVC  
 Slot Size: 0.01 in  
 Top: 50 ft bgs  
 Bottom: 60 ft bgs

(Continued Next Page)

**CLIENT** ARNG, USACE Baltimore District **PROJECT NAME** Fort William Henry Harrison  
**PROJECT NUMBER** 60552172 **SITE NAME** AOI 3

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ENVIRONMENTAL DATA	WELL DIAGRAM
55	SS	100	6-20-33 (53)	ML		51.5 NOT SAMPLED. (continued) 3942.1 55.0 SILT, wet, white, medium plasticity with some clay. 3938.6 56.5 NOT SAMPLED. 3937.1	AOI03-MW02-GW	 <p><b>Well Screen</b> Type: Schedule 40 PVC Slot Size: 0.01 in Top: 50 ft bgs Bottom: 60 ft bgs</p>
60								

Bottom of borehole at 60.0 feet.

**Notes:**

- Headspace screening values represent total volatile organic vapors (referenced to an isobutylene standard) measured with a Photoionization Detector (PID) with 10.6 eV lamp.
- Coordinates and elevation data in NAVD88 for vertical datum and NAD83/91 for horizontal datum in Montana State Plane.
- First 5 feet cleared with air knife.

## **Appendix F**

### **Analytical Results**



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**Appendix F Laboratory Data  
Decontamination Water  
Site Inspection Report, Fort William Henry Harrison**

Area of Interest Sample ID Sample Date	DECON SOURCE				QC																							
	FTWHH-DECON				FIELD BLANK				AOI1-MW2-FRB				AOI2-FRB				AOI2-MW2-EB				AOI3-SB1-0-2-EB				MW-10EB			
	11/08/2018				11/08/2018				05/29/2019				05/20/2019				05/30/2019				05/21/2019				05/29/2019			
Analyte	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
Water, PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (ng/L)																												
6:2 FTS	<	3.33	8.33	U	<	3.33	8.33	U	<	3.33	8.33	U	<	4.00	10.0	U	<	3.57	8.93	U	<	4.55	11.4	U	<	3.85	9.62	U
8:2 FTS	<	3.33	8.33	U	<	3.33	8.33	U	<	3.33	8.33	U	<	4.00	10.0	U	<	3.57	8.93	U	<	4.55	11.4	U	<	3.85	9.62	U
NEtFOSAA	<	6.67	8.33	U	<	6.67	8.33	U	<	6.67	8.33	U	<	8.00	10.0	U	<	7.14	8.93	U	<	9.09	11.4	U	<	7.69	9.62	U
NMeFOSAA	<	6.67	8.33	U	<	6.67	8.33	U	<	6.67	8.33	U	<	8.00	10.0	U	<	7.14	8.93	U	<	9.09	11.4	U	<	7.69	9.62	U
PFBA	<	3.33	8.33	U	<	3.33	8.33	U	<	3.33	8.33	U	<	4.00	10.0	U	<	3.57	8.93	U	<	4.55	11.4	U	<	3.85	9.62	U
PFBS	<	3.33	8.33	U	<	3.33	8.33	U	<	3.33	8.33	U	<	4.00	10.0	U	<	3.57	8.93	U	<	4.55	11.4	U	<	3.85	9.62	U
PFDA	<	3.33	8.33	U	<	3.33	8.33	U	<	3.33	8.33	U	<	4.00	10.0	U	<	3.57	8.93	U	<	4.55	11.4	U	<	3.85	9.62	U
PFDoA	<	3.33	8.33	U	<	3.33	8.33	U	<	3.33	8.33	U	<	4.00	10.0	U	<	3.57	8.93	U	<	4.55	11.4	U	<	3.85	9.62	U
PFHpA	<	3.33	8.33	U	<	3.33	8.33	U	<	3.33	8.33	U	<	4.00	10.0	U	<	3.57	8.93	U	<	4.55	11.4	U	<	3.85	9.62	U
PFHxA	<	3.33	8.33	U	<	3.33	8.33	U	<	3.33	8.33	U	<	4.00	10.0	U	<	3.57	8.93	U	<	4.55	11.4	U	<	3.85	9.62	U
PFHxS	<	3.33	8.33	U	<	3.33	8.33	U	<	3.33	8.33	U	<	4.00	10.0	U	<	3.57	8.93	U	<	4.55	11.4	U	<	3.85	9.62	U
PFNA	<	3.33	8.33	U	<	3.33	8.33	U	<	3.33	8.33	U	<	4.00	10.0	U	<	3.57	8.93	U	<	4.55	11.4	U	<	3.85	9.62	U
PFOA	<	3.33	8.33	U	<	3.33	8.33	U	<	3.33	8.33	U	<	4.00	10.0	U	<	3.57	8.93	U	<	4.55	11.4	U	<	3.85	9.62	U
PFOS	<	3.33	8.33	U	1.62	3.33	8.33	J	<	3.33	8.33	U	<	4.00	10.0	U	<	3.57	8.93	U	<	4.55	11.4	U	<	3.85	9.62	U
PFPeA	<	3.33	8.33	U	<	3.33	8.33	U	<	3.33	8.33	U	<	4.00	10.0	U	<	3.57	8.93	U	<	4.55	11.4	U	<	3.85	9.62	U
PFTeDA	<	3.33	8.33	U	<	3.33	8.33	U	<	3.33	8.33	U	<	4.00	10.0	U	<	3.57	8.93	U	<	4.55	11.4	U	<	3.85	9.62	U
PFTrDA	<	3.33	8.33	U	<	3.33	8.33	U	<	3.33	8.33	U	<	4.00	10.0	U	<	3.57	8.93	U	<	4.55	11.4	U	<	3.85	9.62	U
PFUnDA	<	3.33	8.33	U	<	3.33	8.33	U	<	3.33	8.33	U	<	4.00	10.0	U	<	3.57	8.93	U	<	4.55	11.4	U	<	3.85	9.62	U

Interpreted Qualifiers

J = Estimated concentration

U = The analyte was not detected at a level greater than or equal to the adjusted detection limit (DL)

Chemical Abbreviations

6:2 FTS	6:2 fluorotelomer sulfonate
8:2 FTS	8:2 fluorotelomer sulfonate
NEtFOSAA	N-ethyl perfluorooctane- sulfonamidoacetic acid
NMeFOSAA	N-methyl perfluorooctanesulfonamidoacetic acid
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFDoA	perfluorododecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid
PFTeDA	perfluorotetradecanoic acid
PFTTrDA	perfluorotridecanoic acid
PFUnDA	perfluoro-n-undecanoic acid

Acronyms and Abbreviations

AOI	Area of Interest
DUP	Duplicate
ERB	Equipment reagent blank
FRB	Field reagent blank
FTWHH	Fort William Henry Harrison
LCMSMS	Liquid Chromatography Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
QC	Quality Control
QSM	Quality Systems Manual
Qual	Interpreted Qualifier
ng/L	nanogram per liter
-	Not applicable
<	analyte not detected above the LOD

**Appendix F Laboratory Data  
Decontamination Water  
Site Inspection Report, Fort William Henry Harrison**

Area of Interest Sample ID Sample Date	QC																											
	FRB-20191203				FRB-20200317				FTWHH-ERB-01				FTWHH-ERB-02				FTWHH-ERB-03				FTWHH-ERB-04				FTWHH-FRB-01			
	12/03/2019				03/16/2020				10/06/2020				10/07/2020				10/10/2020				10/12/2020				10/10/2020			
Analyte	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
<b>Water, PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (ng/L)</b>																												
6:2 FTS	-	-	-	-	-	-	-	-	<	4.72	11.8	U	<	6.25	15.6	U	9.70	4.00	10.0	J	<	4.00	10.0	U	<	4.00	10.0	U
8:2 FTS	-	-	-	-	-	-	-	-	<	4.72	11.8	U	<	6.25	15.6	U	<	4.00	10.0	U	<	4.00	10.0	U	<	4.00	10.0	U
NEtFOSAA	<	6.67	8.33	U	<	8.00	10.0	U	<	9.43	11.8	U	<	12.5	15.6	U	<	8.00	10.0	U	<	8.00	10.0	U	<	8.00	10.0	U
NMeFOSAA	<	6.67	8.33	U	<	8.00	10.0	U	<	9.43	11.8	U	<	12.5	15.6	U	<	8.00	10.0	U	<	8.00	10.0	U	<	8.00	10.0	U
PFBA	-	-	-	-	-	-	-	-	<	4.72	11.8	U	<	6.25	15.6	U	<	4.00	10.0	U	<	4.00	10.0	U	<	4.00	10.0	U
PFBS	<	3.33	8.33	U	<	4.00	10.0	U	<	4.72	11.8	U	<	6.25	15.6	U	<	4.00	10.0	U	<	4.00	10.0	U	<	4.00	10.0	U
PFDA	<	3.33	8.33	U	<	4.00	10.0	U	<	4.72	11.8	U	<	6.25	15.6	U	<	4.00	10.0	U	<	4.00	10.0	U	<	4.00	10.0	U
PFDoA	<	3.33	8.33	U	<	4.00	10.0	U	<	4.72	11.8	U	<	6.25	15.6	U	<	4.00	10.0	U	<	4.00	10.0	U	<	4.00	10.0	U
PFHpA	<	3.33	8.33	U	<	4.00	10.0	U	<	4.72	11.8	U	<	6.25	15.6	U	<	4.00	10.0	U	<	4.00	10.0	U	<	4.00	10.0	U
PFHxA	<	3.33	8.33	U	<	4.00	10.0	U	<	4.72	11.8	U	<	6.25	15.6	U	<	4.00	10.0	U	<	4.00	10.0	U	2.28	4.00	10.0	J
PFHxS	<	3.33	8.33	U	<	4.00	10.0	U	<	4.72	11.8	U	<	6.25	15.6	U	<	4.00	10.0	U	<	4.00	10.0	U	<	4.00	10.0	U
PFNA	<	3.33	8.33	U	<	4.00	10.0	U	<	4.72	11.8	U	<	6.25	15.6	U	<	4.00	10.0	U	<	4.00	10.0	U	<	4.00	10.0	U
PFOA	<	3.33	8.33	U	<	4.00	10.0	U	<	4.72	11.8	U	<	6.25	15.6	U	<	4.00	10.0	U	<	4.00	10.0	U	<	4.00	10.0	U
PFOS	<	3.33	8.33	U	<	4.00	10.0	U	<	4.72	11.8	U	<	6.25	15.6	U	<	4.00	10.0	U	<	4.00	10.0	U	<	4.00	10.0	U
PFPeA	-	-	-	-	-	-	-	-	<	4.72	11.8	U	<	6.25	15.6	U	<	4.00	10.0	U	<	4.00	10.0	U	<	4.00	10.0	U
PFTeDA	<	3.33	8.33	U	<	4.00	10.0	U	<	4.72	11.8	U	<	6.25	15.6	U	<	4.00	10.0	U	<	4.00	10.0	U	<	4.00	10.0	U
PFTTrDA	<	3.33	8.33	U	<	4.00	10.0	U	<	4.00	10.0	U	<	4.00	10.0	U	<	4.00	10.0	U	<	4.00	10.0	U	<	4.00	10.0	U
PFUnDA	<	3.33	8.33	U	<	4.00	10.0	U	<	4.72	11.8	U	<	6.25	15.6	U	<	4.00	10.0	U	<	4.00	10.0	U	<	4.00	10.0	U

Interpreted Qualifiers

J = Estimated concentration

U = The analyte was not detected at a level greater than or equal to the adjusted detection limit (DL)

Chemical Abbreviations

6:2 FTS	6:2 fluorotelomer sulfonate
8:2 FTS	8:2 fluorotelomer sulfonate
NEtFOSAA	N-ethyl perfluorooctane- sulfonamidoacetic acid
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PFDA	perfluorodecanoic acid
PFDoA	perfluorododecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid
PFTeDA	perfluorotetradecanoic acid
PFTTrDA	perfluorotridecanoic acid
PFUnDA	perfluoro-n-undecanoic acid

Acronyms and Abbreviations

AOI	Area of Interest
DUP	Duplicate
ERB	Equipment reagent blank
FRB	Field reagent blank
FTWHH	Fort William Henry Harrison
LCMSMS	Liquid Chromatography Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
QC	Quality Control
QSM	Quality Systems Manual
Qual	Interpreted Qualifier
ng/L	nanogram per liter
-	Not applicable
<	analyte not detected above the LOD

Appendix F Laboratory Data  
Residential Drinking Water Results  
Site Inspection Report, Fort William Henry Harrison

Area of Interest Sample ID Sample Date		POTABLE																											
		POTABLE-01				POTABLE-02				POTABLE-02-DUP				POTABLE-03				POTABLE-04				POTABLE-05				POTABLE-05-DUP			
		12/03/2019				12/03/2019				12/03/2019				12/03/2019				12/03/2019				03/16/2020				03/16/2020			
Analyte	EPA HA *	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
Water, PFAS via EPA 537.1 (ng/L)																													
NEtFOSAA	-	<	6.67	8.33	U	<	6.67	8.33	U	<	6.67	8.33	U	<	6.67	8.33	U	<	6.67	8.33	U	<	8.00	10.0	U	<	8.00	10.0	U
NMeFOSAA	-	<	6.67	8.33	U	<	6.67	8.33	U	<	6.67	8.33	U	<	6.67	8.33	U	<	6.67	8.33	U	<	8.00	10.0	U	<	8.00	10.0	U
PFBS	-	7.31	3.33	8.33	J	4.23	3.33	8.33	J	4.31	3.33	8.33	J	2.55	3.33	8.33	J	2.48	3.33	8.33	J	21.2	4.00	10.0		20.6	4.00	10.0	
PFDA	-	<	3.33	8.33	U	<	3.33	8.33	U	<	3.33	8.33	U	<	3.33	8.33	U	<	3.33	8.33	U	<	4.00	10.0	U	<	4.00	10.0	U
PFDaA	-	<	3.33	8.33	U	<	3.33	8.33	U	<	3.33	8.33	U	<	3.33	8.33	U	<	3.33	8.33	U	<	4.00	10.0	U	<	4.00	10.0	U
PFHpA	-	10.2	3.33	8.33		3.82	3.33	8.33	J	4.05	3.33	8.33	J	5.77	3.33	8.33	J	3.81	3.33	8.33	J	20.9	4.00	10.0		19.1	4.00	10.0	
PFHxA	-	30.2	3.33	8.33		13.4	3.33	8.33		14.2	3.33	8.33		14.4	3.33	8.33		10.0	3.33	8.33		54.1	4.00	10.0		53.2	4.00	10.0	
PFHxS	-	59.8	3.33	8.33		24.3	3.33	8.33		24.6	3.33	8.33		19.1	3.33	8.33		14.6	3.33	8.33		182	4.00	10.0		186	4.00	10.0	
PFNA	-	<	3.33	8.33	U	<	3.33	8.33	U	<	3.33	8.33	U	<	3.33	8.33	U	<	3.33	8.33	U	<	4.00	10.0	U	<	4.00	10.0	U
PFOA	70	6.46	3.33	8.33	J	3.75	3.33	8.33	J	4.41	3.33	8.33	J	6.87	3.33	8.33	J	7.76	3.33	8.33	J	16.6	4.00	10.0		16.5	4.00	10.0	
PFOS	70	17.0	3.33	8.33		3.11	3.33	8.33	J	3.15	3.33	8.33	J	15.4	3.33	8.33		13.3	3.33	8.33		19.5	4.00	10.0		22.1	4.00	10.0	
PFTeDA	-	<	3.33	8.33	U	<	3.33	8.33	UJ	<	3.33	8.33	U	<	3.33	8.33	U	<	3.33	8.33	U	<	4.00	10.0	U	<	4.00	10.0	U
PFTrDA	-	<	3.33	8.33	U	<	3.33	8.33	UJ	<	3.33	8.33	U	<	3.33	8.33	U	<	3.33	8.33	U	<	4.00	10.0	U	<	4.00	10.0	U
PFUnDA	-	<	3.33	8.33	U	<	3.33	8.33	U	<	3.33	8.33	U	<	3.33	8.33	U	<	3.33	8.33	U	<	4.00	10.0	U	<	4.00	10.0	U
Total PFOA+PFOS	70	23.5	3.33			6.86	3.33			7.56	3.33			22.3	3.33			21.1	3.33			36.1	4.00			38.6	4.00		

Grey Fill

Detected concentration exceeded EPA HA

References  
a. United States Environmental Protection Agency (EPA). 2016. Drinking Water Health Advisory for Perfluorooctanoic Acid (PFOA). Office of Water (4304T). Health and Ecological Criteria Division, Washington, DC 20460. EPA Document Number: 822-R-16-005. May 2016. / EPA. 2016. Drinking Water Health Advisory for Perfluorooctane Sulfonate (PFOS). Office of Water (4304T). Health and Ecological Criteria Division, Washington, DC 20460. EPA Document Number: 822-R-16-004. May 2016.

Interpreted Qualifiers  
J = Estimated concentration  
U = The analyte was not detected at a level greater than or equal to the adjusted detection limit (DL)  
UJ = The analyte was not detected at a level greater than or equal to the adjusted DL. However, the reported adjusted DL is approximate and may be inaccurate or imprecise.

Chemical Abbreviations	
NEtFOSAA	N-ethyl perfluorooctane- sulfonamidoacetic acid
NMeFOSAA	N-methyl perfluorooctanesulfonamidoacetic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFDaA	perfluorododecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFTeDA	perfluorotetradecanoic acid
PFTrDA	perfluorotridecanoic acid
PFUnDA	perfluoro-n-undecanoic acid

Acronyms and Abbreviations	
DUP	Duplicate
EPA	United States Environmental Protection Agency
HA	Health Advisory
LOD	Limit of Detection
LOQ	Limit of Quantitation
Qual	Interpreted Qualifier
ng/L	nanogram per liter
-	Not applicable
<	analyte not detected above the LOD



**Appendix F Laboratory Data  
TOC and pH  
Site Inspection Report, Fort William Henry Harrison**

Area of Interest Sample ID Sample Date Depth	AOI01																											
	AOI1-HA1-0-2				AOI1-HA1-2-4				AOI1-HA2-0-2				AOI1-HA2-2-4				AOI1-SB1-0-2				AOI1-SB1-20-22				AOI1-SB1-38-40			
	02/12/2019				02/12/2019				02/12/2019				02/12/2019				02/13/2019				02/13/2019				02/13/2019			
	0 - 2 ft				2 - 4 ft				0 - 2 ft				2 - 4 ft				0 - 2 ft				20 - 22 ft				38 - 40 ft			
Analyte	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
pH	8.74	1.00	1.00		9.02	1.00	1.00		8.59	1.00	1.00		8.12	1.00	1.00		8.56	1.00	1.00		8.92	1.00	1.00		8.67	1.00	1.00	
Total Organic Carbon (mg/kg)	625	200	250		<	200	250	U	<	200	250	U	<	200	250	U	5690	200	250		<	200	250	U	<	200	250	U

Acronyms and Abbreviations

AOI	Area of Interest
DUP	Duplicate
ft	ft
HA	Hand Auger
LOD	Limit of Detection
LOQ	Limit of Quantitation
Qual	Interpreted Qualifier
mg/kg	milligram per kilogram
SB	Soil boring
SS	Surface Soil
<	analyte not detected above the LOD

Interpreted Qualifiers

J	= Estimated concentration
U	= The analyte was not detected at a level greater than or equal to the adjusted detection limit (DL)

**Appendix F Laboratory Data**  
**TOC and pH**  
**Site Inspection Report, Fort William Henry Harrison**

Area of Interest Sample ID Sample Date Depth	AOI01																											
	AOI1-SB2-0-2				AOI1-SB2-15-17				AOI1-SB2-28-30				AOI1-SB3-0-2				AOI1-SB3-18-20				AOI1-SB3-18-20-DUP				AOI1-SB3-38-40			
	02/15/2019				02/15/2019				02/15/2019				02/20/2019				02/20/2019				02/20/2019				02/20/2019			
	0 - 2 ft				15 - 17 ft				28 - 30 ft				0 - 2 ft				18 - 20 ft				18 - 20 ft				38 - 40 ft			
Analyte	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
pH	8.64	1.00	1.00		8.95	1.00	1.00		8.70	1.00	1.00		8.41	1.00	1.00		9.41	1.00	1.00		8.55	1.00	1.00		9.46	1.00	1.00	
Total Organic Carbon (mg/kg)	7080	200	250		1900	200	250		<	200	250	U	13400	200	250		<	200	250	U	312	200	250		<	200	250	U

Acronyms and Abbreviations

AOI	Area of Interest
DUP	Duplicate
ft	ft
HA	Hand Auger
LOD	Limit of Detection
LOQ	Limit of Quantitation
Qual	Interpreted Qualifier
mg/kg	milligram per kilogram
SB	Soil boring
SS	Surface Soil
<	analyte not detected above the LOD

Interpreted Qualifiers

J	= Estimated concentration
U	= The analyte was not detected at a level greater than or equal to the adjusted detection limit (DL)

**Appendix F Laboratory Data  
TOC and pH  
Site Inspection Report, Fort William Henry Harrison**

Area of Interest Sample ID Sample Date Depth	AOI01																											
	AOI01-04-SB-30-32				AOI01-05-SB-15-17				AOI01-05-SB-15-17-DUP				AOI1-SS1-0-2				AOI1-SS1-0-2R				AOI1-SS2-0-2				AOI1-SS3-0-2			
	10/09/2020				10/08/2020				10/08/2020				02/14/2019				05/20/2019				02/14/2019				02/14/2019			
	30 - 32 ft				15 - 17 ft				15 - 17 ft				0 - 2 ft				0 - 2 ft				0 - 2 ft				0 - 2 ft			
Analyte	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
pH	8.18	1.00	1.00	J	7.61	1.00	1.00	J	8.92	1.00	1.00	J	8.87	1.00	1.00		8.10	1.00	1.00		8.53	1.00	1.00		8.93	1.00	1.00	
Total Organic Carbon (mg/kg)	838	200	250		977	200	250		1750	200	250		17300	200	250		14800	200	250		3400	200	250		6570	200	250	

Acronyms and Abbreviations

AOI      Area of Interest  
DUP      Duplicate  
ft      ft  
HA      Hand Auger  
LOD      Limit of Detection  
LOQ      Limit of Quantitation  
Qual      Interpreted Qualifier  
mg/kg      milligram per kilogram  
SB      Soil boring  
SS      Surface Soil  
<      analyte not detected above the LOD

Interpreted Qualifiers

J = Estimated concentration  
U = The analyte was not detected at a level greater than or equal to the adjusted detection limit (DL)

**Appendix F Laboratory Data**  
**TOC and pH**  
**Site Inspection Report, Fort William Henry Harrison**

Area of Interest Sample ID Sample Date Depth	AOI01												AOI02															
	AOI1-SS4-0-2				AOI1-SS5-0-2				AOI1-SS6-0-2				AOI2-HA1-0-2				AOI2-HA1-2-4				AOI2-HA2-0-2				AOI2-HA2-2-4			
	02/14/2019				02/14/2019				02/20/2019				02/13/2019				02/13/2019				02/13/2019				02/13/2019			
	0 - 2 ft				0 - 2 ft				0 - 2 ft				0 - 2 ft				2 - 4 ft				0 - 2 ft				2 - 4 ft			
	Analyte	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ
pH	7.93	1.00	1.00		8.50	1.00	1.00		8.65	1.00	1.00		7.95	1.00	1.00		8.06	1.00	1.00		7.94	1.00	1.00		8.15	1.00	1.00	
Total Organic Carbon (mg/kg)	2540	200	250		4330	200	250		3220	200	250		6450	200	250		5280	200	250		6760	200	250		5210	200	250	

Acronyms and Abbreviations

AOI      Area of Interest  
DUP      Duplicate  
ft      ft  
HA      Hand Auger  
LOD      Limit of Detection  
LOQ      Limit of Quantitation  
Qual      Interpreted Qualifier  
mg/kg      milligram per kilogram  
SB      Soil boring  
SS      Surface Soil  
<      analyte not detected above the LOD

Interpreted Qualifiers

J = Estimated concentration  
U = The analyte was not detected at a level greater than or equal to the adjusted detection limit (DL)



**Appendix F Laboratory Data  
TOC and pH  
Site Inspection Report, Fort William Henry Harrison**

Area of Interest Sample ID Sample Date Depth	AOI02																											
	AOI2-HA3-0-2				AOI2-HA3-2-4				AOI2-HA4-0-2				AOI2-HA4-2-4				AOI2-HA5-0-2				AOI2-HA5-2-4				AOI2-HA6-0-2			
	02/13/2019				02/13/2019				02/13/2019				02/13/2019				02/13/2019				02/13/2019				02/12/2019			
	0 - 2 ft				2 - 4 ft				0 - 2 ft				2 - 4 ft				0 - 2 ft				2 - 4 ft				0 - 2 ft			
Analyte	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
pH	7.97	1.00	1.00		8.09	1.00	1.00		7.56	1.00	1.00		7.69	1.00	1.00		7.82	1.00	1.00		7.62	1.00	1.00		8.06	1.00	1.00	
Total Organic Carbon (mg/kg)	5870	200	250		7630	200	250		50000	200	250		7770	200	250		11500	200	250		13900	200	250		10900	200	250	

Acronyms and Abbreviations

AOI	Area of Interest
DUP	Duplicate
ft	ft
HA	Hand Auger
LOD	Limit of Detection
LOQ	Limit of Quantitation
Qual	Interpreted Qualifier
mg/kg	milligram per kilogram
SB	Soil boring
SS	Surface Soil
<	analyte not detected above the LOD

Interpreted Qualifiers

J = Estimated concentration  
U = The analyte was not detected at a level greater than or equal to the adjusted detection limit (DL)

**Appendix F Laboratory Data  
TOC and pH  
Site Inspection Report, Fort William Henry Harrison**

Area of Interest Sample ID Sample Date Depth	AOI02																											
	AOI2-HA6-2-4				AOI2-HA6-2-4-DUP				AOI2-SB1-0-2				AOI2-SB1-9-11				AOI2-SB1-18-20				AOI2-SB2-0-2				AOI2-SB2-0-2-DUP			
	02/12/2019				02/12/2019				05/21/2019				05/21/2019				05/21/2019				05/23/2019				05/23/2019			
	2 - 4 ft				2 - 4 ft				0 - 2 ft				9 - 11 ft				18 - 20 ft				0 - 2 ft				0 - 2 ft			
Analyte	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
pH	8.24	1.00	1.00		8.17	1.00	1.00		8.31	1.00	1.00		8.81	1.00	1.00		8.78	1.00	1.00		8.49	1.00	1.00		8.47	1.00	1.00	
Total Organic Carbon (mg/kg)	4740	200	250		4250	200	250		16500	200	250		1470	200	250		636	200	250		17900	200	250		16900	200	250	

Acronyms and Abbreviations

AOI Area of Interest  
DUP Duplicate  
ft ft  
HA Hand Auger  
LOD Limit of Detection  
LOQ Limit of Quantitation  
Qual Interpreted Qualifier  
mg/kg milligram per kilogram  
SB Soil boring  
SS Surface Soil  
< analyte not detected above the LOD

Interpreted Qualifiers

J = Estimated concentration  
U = The analyte was not detected at a level greater than or equal to the adjusted detection limit (DL)

**Appendix F Laboratory Data  
TOC and pH  
Site Inspection Report, Fort William Henry Harrison**

Area of Interest Sample ID Sample Date Depth	AOI02																											
	AOI2-SB2-8-10				AOI2-SB2-18-20				AOI02-03-SB-00-02				AOI2-SS1-0-2				AOI2-SS2-0-2				AOI2-SS2-0-2-DUP				AOI2-SS3-0-2			
	05/23/2019				05/23/2019				10/06/2020				05/20/2019				05/20/2019				05/20/2019				05/20/2019			
	8 - 10 ft				18 - 20 ft				0 - 2 ft				0 - 2 ft				0 - 2 ft				0 - 2 ft				0 - 2 ft			
Analyte	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
pH	9.11	1.00	1.00		9.58	1.00	1.00		8.75	1.00	1.00	J	8.37	1.00	1.00		8.69	1.00	1.00		8.72	1.00	1.00		8.44	1.00	1.00	
Total Organic Carbon (mg/kg)	<	200	250	U	1440	200	250		8920	200	250		7170	200	250		4660	200	250		4850	200	250		3900	200	250	

Acronyms and Abbreviations

AOI Area of Interest  
 DUP Duplicate  
 ft ft  
 HA Hand Auger  
 LOD Limit of Detection  
 LOQ Limit of Quantitation  
 Qual Interpreted Qualifier  
 mg/kg milligram per kilogram  
 SB Soil boring  
 SS Surface Soil  
 < analyte not detected above the LOD

Interpreted Qualifiers

J = Estimated concentration  
 U = The analyte was not detected at a level greater than or equal to the adjusted detection limit (DL)

**Appendix F Laboratory Data  
TOC and pH  
Site Inspection Report, Fort William Henry Harrison**

Area of Interest Sample ID Sample Date Depth	AOI02																								AOI03											
	AOI2-SS4-0-2				AOI2-SS5-0-2				AOI3-HA1-0-2				AOI3-HA1-2-4				AOI3-SB1-0-2				AOI3-SB1-18-20				AOI3-SB1-40-42											
	05/20/2019				05/20/2019				02/12/2019				02/12/2019				05/22/2019				05/22/2019				05/22/2019											
	0 - 2 ft				0 - 2 ft				0 - 2 ft				2 - 4 ft				0 - 2 ft				18 - 20 ft				40 - 42 ft											
Analyte	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual								
pH	8.62	1.00	1.00		8.33	1.00	1.00		8.34	1.00	1.00		8.87	1.00	1.00		8.16	1.00	1.00		9.73	1.00	1.00		8.08	1.00	1.00									
Total Organic Carbon (mg/kg)	3210	200	250		6930	200	250		641	200	250	J	<	200	250	U	8360	200	250		979	200	250		245	200	250	J								

Acronyms and Abbreviations

AOI	Area of Interest
DUP	Duplicate
ft	ft
HA	Hand Auger
LOD	Limit of Detection
LOQ	Limit of Quantitation
Qual	Interpreted Qualifier
mg/kg	milligram per kilogram
SB	Soil boring
SS	Surface Soil
<	analyte not detected above the LOD

Interpreted Qualifiers

J	= Estimated concentration
U	= The analyte was not detected at a level greater than or equal to the adjusted detection limit (DL)



Appendix F Laboratory Data  
TOC and pH  
Site Inspection Report, Fort William Henry Harrison

Area of Interest	AOI03			
Sample ID	AOI03-SS5-00-02			
Sample Date	10/07/2020			
Depth	0 - 2 ft			
Analyte	Result	LOD	LOQ	Qual
pH	8.56	1.00	1.00	J
Total Organic Carbon (mg/kg)	4600	200	250	

Acronyms and Abbreviations

AOI	Area of Interest
DUP	Duplicate
ft	ft
HA	Hand Auger
LOD	Limit of Detection
LOQ	Limit of Quantitation
Qual	Interpreted Qualifier
mg/kg	milligram per kilogram
SB	Soil boring
SS	Surface Soil
<	analyte not detected above the LOD

Interpreted Qualifiers

J = Estimated concentration  
U = The analyte was not detected at a level greater than or equal to the adjusted detection limit (DL)

**Appendix F Laboratory Data**  
**Deep Subsurface Soil**  
**Site Inspection Report, Fort William Henry Harrison**

Area of Interest Sample ID Sample Date Depth	AOI01																											
	AOI1-SB1-20-22				AOI1-SB1-20-22 (RE)				AOI1-SB1-38-40				AOI1-SB2-15-17				AOI1-SB2-28-30				AOI1-SB3-18-20				AOI1-SB3-18-20-DUP			
	02/13/2019				02/13/2019				02/13/2019				02/15/2019				02/15/2019				02/20/2019				02/20/2019			
	20 - 22 ft				20 - 22 ft				38 - 40 ft				15 - 17 ft				28 - 30 ft				18 - 20 ft				18 - 20 ft			
Analyte	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
<b>Soil, PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (ug/Kg)</b>																												
6:2 FTS	0.051	0.418	1.04	J	-	-	-	-	<	0.439	1.10	U	<	0.414	1.03	U	<	0.434	1.08	U	<	0.421	1.05	U	<	0.421	1.05	U
8:2 FTS	<	0.418	1.04	U	-	-	-	-	<	0.439	1.10	U	<	0.414	1.03	U	<	0.434	1.08	U	0.117	0.421	1.05	J	<	0.421	1.05	U
NEtFOSAA	<	0.418	1.04	U	-	-	-	-	<	0.439	1.10	U	<	0.414	1.03	U	<	0.434	1.08	U	0.135	0.421	1.05	J	<	0.421	1.05	U
NMeFOSAA	<	0.418	1.04	U	-	-	-	-	<	0.439	1.10	U	<	0.414	1.03	U	<	0.434	1.08	U	0.136	0.421	1.05	J	<	0.421	1.05	U
PFBA	-	-	-	-	0.00848	0.423	1.06	J	<	0.439	1.10	U	<	0.414	1.03	U	<	0.434	1.08	U	<	0.421	1.05	U	<	0.421	1.05	U
PFBS	0.00418	0.418	1.04	J	-	-	-	-	<	0.439	1.10	U	0.142	0.414	1.03	J	<	0.434	1.08	U	0.021	0.421	1.05	J	<	0.421	1.05	U
PFDA	0.014	0.418	1.04	J	-	-	-	-	0.013	0.439	1.10	J	<	0.414	1.03	U	<	0.434	1.08	U	<	0.421	1.05	U	<	0.421	1.05	U
PFDoA	0.00994	0.418	1.04	J	-	-	-	-	<	0.439	1.10	U	<	0.414	1.03	U	<	0.434	1.08	U	0.233	0.421	1.05	J	<	0.421	1.05	U
PFHpA	<	0.418	1.04	U	-	-	-	-	<	0.439	1.10	U	<	0.414	1.03	U	<	0.434	1.08	U	0.021	0.421	1.05	J	0.00431	0.421	1.05	J
PFHxA	0.035	0.418	1.04	J	-	-	-	-	<	0.439	1.10	U	0.226	0.414	1.03	J	0.059	0.434	1.08	J	<	0.421	1.05	U	<	0.421	1.05	U
PFHxS	<	0.418	1.04	U	-	-	-	-	<	0.439	1.10	U	0.916	0.414	1.03	J	<	0.434	1.08	U	0.034	0.421	1.05	J	<	0.421	1.05	U
PFNA	<	0.418	1.04	U	-	-	-	-	<	0.439	1.10	U	<	0.414	1.03	U	<	0.434	1.08	U	<	0.421	1.05	U	<	0.421	1.05	U
PFOA	<	0.418	1.04	U	-	-	-	-	<	0.439	1.10	U	0.055	0.414	1.03	J	<	0.434	1.08	U	<	0.421	1.05	U	<	0.421	1.05	U
PFOS	-	-	-	-	0.039	0.423	1.06	J	0.014	0.439	1.10	J	0.478	0.414	1.03	J	<	0.434	1.08	U	0.526	0.421	1.05	J	<	0.421	1.05	U
PFPeA	<	0.418	1.04	U	-	-	-	-	<	0.439	1.10	U	<	0.414	1.03	U	<	0.434	1.08	U	<	0.421	1.05	U	<	0.421	1.05	U
PFTeDA	<	0.418	1.04	U	-	-	-	-	<	0.439	1.10	U	<	0.414	1.03	U	<	0.434	1.08	U	0.13	0.421	1.05	J	0.012	0.421	1.05	J
PFTTrDA	<	0.418	1.04	U	-	-	-	-	<	0.439	1.10	U	<	0.414	1.03	U	<	0.434	1.08	U	0.238	0.421	1.05	J	0.00534	0.421	1.05	J
PFUnDA	0.00496	0.418	1.04	J	-	-	-	-	<	0.439	1.10	U	<	0.414	1.03	U	<	0.434	1.08	U	0.14	0.421	1.05	J	<	0.421	1.05	U

Interpreted Qualifiers

J = Estimated concentration

U = The analyte was not detected at a level greater than or equal to the adjusted detection limit (DL)

Chemical Abbreviations

6:2 FTS	6:2 fluorotelomer sulfonate
8:2 FTS	8:2 fluorotelomer sulfonate
NEtFOSAA	N-ethyl perfluorooctane- sulfonamidoacetic acid
NMeFOSAA	N-methyl perfluorooctanesulfonamidoacetic acid
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFDoA	perfluorododecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid
PFTeDA	perfluorotetradecanoic acid
PFTTrDA	perfluorotridecanoic acid
PFUnDA	perfluoro-n-undecanoic acid

Acronyms and Abbreviations

AOI	Area of Interest
DUP	Duplicate
ft	feet
LCMSMS	Liquid Chromatography Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
QSM	Quality Systems Manual
Qual	Interpreted Qualifier
RE	Re-extracted
SB	Soil boring
ug/Kg	micrograms per Kilogram
-	Not applicable
<	analyte not detected above the LOD

**Appendix F Laboratory Data**  
**Deep Subsurface Soil**  
**Site Inspection Report, Fort William Henry Harrison**

Area of Interest Sample ID Sample Date Depth	AOI1																											
	AOI1-SB3-38-40				AOI01-04-SB-15-17				AOI01-04-SB-30-32				AOI01-05-SB-15-17				AOI01-05-SB-30-32				AOI01-06-SB-15-17				AOI01-06-SB-30-32			
	02/20/2019				10/09/2020				10/09/2020				10/08/2020				10/08/2020				10/09/2020				10/09/2020			
	38 - 40 ft				15 - 17 ft				30 - 32 ft				15 - 17 ft				30 - 32 ft				15 - 17 ft				30 - 32 ft			
Analyte	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
<b>Soil, PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (ug/Kg)</b>																												
6:2 FTS	<	0.502	1.26	U	<	0.467	1.17	U	<	0.480	1.20	U	<	0.460	1.15	U	<	0.409	1.02	U	<	0.428	1.07	U	<	0.452	1.13	U
8:2 FTS	<	0.502	1.26	U	<	0.467	1.17	U	<	0.480	1.20	U	<	0.460	1.15	U	<	0.409	1.02	U	<	0.428	1.07	U	<	0.452	1.13	U
NEtFOSAA	0.025	0.502	1.26	J	<	0.467	1.17	U	<	0.480	1.20	U	<	0.460	1.15	U	<	0.409	1.02	U	<	0.428	1.07	U	<	0.452	1.13	U
NMeFOSAA	0.02	0.502	1.26	J	<	0.467	1.17	U	<	0.480	1.20	U	<	0.460	1.15	U	<	0.409	1.02	U	<	0.428	1.07	U	<	0.452	1.13	U
PFBA	<	0.502	1.26	U	<	0.467	1.17	U	<	0.480	1.20	U	<	0.460	1.15	U	<	0.409	1.02	U	<	0.428	1.07	U	<	0.452	1.13	U
PFBS	<	0.502	1.26	U	<	0.467	1.17	U	<	0.480	1.20	U	<	0.460	1.15	U	<	0.409	1.02	U	<	0.428	1.07	U	<	0.452	1.13	U
PFDA	<	0.502	1.26	U	<	0.467	1.17	U	<	0.480	1.20	U	<	0.460	1.15	U	<	0.409	1.02	U	<	0.428	1.07	U	<	0.452	1.13	U
PFDoA	0.013	0.502	1.26	J	<	0.467	1.17	U	<	0.480	1.20	U	<	0.460	1.15	U	<	0.409	1.02	U	<	0.428	1.07	U	<	0.452	1.13	U
PFHpA	0.011	0.502	1.26	J	<	0.467	1.17	U	<	0.480	1.20	U	<	0.460	1.15	U	<	0.409	1.02	U	<	0.428	1.07	U	<	0.452	1.13	U
PFHxA	<	0.502	1.26	U	<	0.467	1.17	U	<	0.480	1.20	U	<	0.460	1.15	U	<	0.409	1.02	U	<	0.428	1.07	U	<	0.452	1.13	U
PFHxS	0.033	0.502	1.26	J	<	0.467	1.17	U	<	0.480	1.20	U	<	0.460	1.15	U	<	0.409	1.02	U	<	0.428	1.07	U	<	0.452	1.13	U
PFNA	<	0.502	1.26	U	<	0.467	1.17	U	<	0.480	1.20	U	<	0.460	1.15	U	<	0.409	1.02	U	<	0.428	1.07	U	<	0.452	1.13	U
PFOA	<	0.502	1.26	U	<	0.467	1.17	U	<	0.480	1.20	U	<	0.460	1.15	U	<	0.409	1.02	U	<	0.428	1.07	U	<	0.452	1.13	U
PFOS	0.135	0.502	1.26	J	<	0.467	1.17	U	<	0.480	1.20	U	<	0.460	1.15	U	<	0.409	1.02	U	<	0.428	1.07	U	<	0.452	1.13	U
PFPeA	<	0.502	1.26	U	<	0.467	1.17	U	<	0.480	1.20	U	<	0.460	1.15	U	<	0.409	1.02	U	<	0.428	1.07	U	<	0.452	1.13	U
PFTeDA	0.015	0.502	1.26	J	<	0.467	1.17	U	<	0.480	1.20	U	<	0.460	1.15	U	<	0.409	1.02	U	<	0.428	1.07	U	<	0.452	1.13	U
PFTrDA	<	0.502	1.26	U	<	0.467	1.17	U	<	0.480	1.20	U	<	0.460	1.15	U	<	0.409	1.02	U	<	0.428	1.07	U	<	0.452	1.13	U
PFUnDA	<	0.502	1.26	U	<	0.467	1.17	U	<	0.480	1.20	U	<	0.460	1.15	U	<	0.409	1.02	U	<	0.428	1.07	U	<	0.452	1.13	U

Interpreted Qualifiers

J = Estimated concentration

U = The analyte was not detected at a level greater than or equal to the adjusted detection limit (DL)

Chemical Abbreviations

6:2 FTS	6:2 fluorotelomer sulfonate
8:2 FTS	8:2 fluorotelomer sulfonate
NEtFOSAA	N-ethyl perfluorooctane- sulfonamidoacetic acid
NMeFOSAA	N-methyl perfluorooctanesulfonamidoacetic acid
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFDoA	perfluorododecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid
PFTeDA	perfluorotetradecanoic acid
PFTrDA	perfluorotridecanoic acid
PFUnDA	perfluoro-n-undecanoic acid

Acronyms and Abbreviations

AOI	Area of Interest
DUP	Duplicate
ft	feet
LCMSMS	Liquid Chromatography Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
QSM	Quality Systems Manual
Qual	Interpreted Qualifier
RE	Re-extracted
SB	Soil boring
ug/Kg	micrograms per Kilogram
-	Not applicable
<	analyte not detected above the LOD

**Appendix F Laboratory Data  
Deep Subsurface Soil  
Site Inspection Report, Fort William Henry Harrison**

Area of Interest Sample ID Sample Date Depth	AOI02												AOI03							
	AOI2-SB1-18-20				AOI2-SB2-18-20				AOI02-03-SB-25-27				AOI3-SB1-18-20				AOI3-SB1-40-42			
	05/21/2019				05/23/2019				10/10/2020				05/22/2019				05/22/2019			
	18 - 20 ft				18 - 20 ft				25 - 27 ft				18 - 20 ft				40 - 42 ft			
Analyte	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
<b>Soil, PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (ug/Kg)</b>																				
6:2 FTS	<	0.403	1.01	U	0.014	0.395	0.988	J	<	0.418	1.05	U	<	0.472	1.18	U	<	0.537	1.34	U
8:2 FTS	<	0.403	1.01	U	0.00707	0.395	0.988	J	<	0.418	1.05	U	<	0.472	1.18	U	<	0.537	1.34	U
NEtFOSAA	<	0.403	1.01	U	<	0.395	0.988	U	<	0.418	1.05	U	<	0.472	1.18	U	<	0.537	1.34	U
NMeFOSAA	<	0.403	1.01	U	<	0.395	0.988	U	<	0.418	1.05	U	<	0.472	1.18	U	<	0.537	1.34	U
PFBA	<	0.403	1.01	U	<	0.395	0.988	U	<	0.418	1.05	U	<	0.472	1.18	U	0.059	0.537	1.34	J
PFBS	<	0.403	1.01	U	0.00186	0.395	0.988	J	<	0.418	1.05	U	<	0.472	1.18	U	0.147	0.537	1.34	J
PFDA	<	0.403	1.01	U	<	0.395	0.988	U	<	0.418	1.05	U	<	0.472	1.18	U	<	0.537	1.34	U
PFDaA	<	0.403	1.01	U	<	0.395	0.988	U	<	0.418	1.05	U	<	0.472	1.18	U	<	0.537	1.34	U
PFHpA	<	0.403	1.01	U	<	0.395	0.988	U	<	0.418	1.05	U	<	0.472	1.18	U	0.022	0.537	1.34	J
PFHxA	<	0.403	1.01	U	<	0.395	0.988	U	<	0.418	1.05	U	0.046	0.472	1.18	J	0.314	0.537	1.34	J
PFHxS	<	0.403	1.01	U	0.029	0.395	0.988	J	<	0.418	1.05	U	0.00812	0.472	1.18	J	0.128	0.537	1.34	J
PFNA	<	0.403	1.01	U	<	0.395	0.988	U	<	0.418	1.05	U	<	0.472	1.18	U	<	0.537	1.34	U
PFOA	<	0.403	1.01	U	<	0.395	0.988	U	<	0.418	1.05	U	<	0.472	1.18	U	<	0.537	1.34	U
PFOS	0.00678	0.403	1.01	J	<	0.395	0.988	U	0.237	0.418	1.05	J	0.056	0.472	1.18	J	0.021	0.537	1.34	J
PFPeA	<	0.403	1.01	U	<	0.395	0.988	U	<	0.418	1.05	U	<	0.472	1.18	U	0.129	0.537	1.34	J
PFTeDA	<	0.403	1.01	U	<	0.395	0.988	U	<	0.418	1.05	U	<	0.472	1.18	U	<	0.537	1.34	U
PFTTrDA	<	0.403	1.01	U	<	0.395	0.988	U	<	0.418	1.05	U	<	0.472	1.18	U	<	0.537	1.34	U
PFUnDA	<	0.403	1.01	U	<	0.395	0.988	U	<	0.418	1.05	U	<	0.472	1.18	U	<	0.537	1.34	U

Interpreted Qualifiers

J = Estimated concentration

U = The analyte was not detected at a level greater than or equal to the adjusted detection limit (DL)

Chemical Abbreviations

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**Appendix F Laboratory Data**  
**Shallow Subsurface Soil**  
**Site Inspection Report, Fort William Henry Harrison**

Area of Interest Sample ID Sample Date Depth		AOI01								AOI02																			
		AOI1-HA1-2-4				AOI1-HA2-2-4				AOI2-HA1-2-4				AOI2-HA2-2-4				AOI2-HA3-2-4				AOI2-HA4-2-4				AOI2-HA5-2-4			
		02/12/2019				02/12/2019				02/13/2019				02/13/2019				02/13/2019				02/13/2019				02/13/2019			
		2 - 4 ft				2 - 4 ft				2 - 4 ft				2 - 4 ft				2 - 4 ft				2 - 4 ft				2 - 4 ft			
Analyte	OSD Screening Level <sup>a</sup>	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
Soil, PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (ug/Kg)																													
6:2 FTS	-	0.058	0.424	1.06	J	0.041	0.418	1.04	J	<	0.476	1.19	U	0.041	0.444	1.11	J	0.046	0.469	1.17	J	0.026	0.471	1.18	J	<	0.412	1.03	U
8:2 FTS	-	<	0.424	1.06	U	<	0.418	1.04	U	<	0.476	1.19	U	<	0.444	1.11	U	<	0.469	1.17	U	<	0.471	1.18	U	<	0.412	1.03	U
NEtFOSAA	-	0.018	0.424	1.06	J	<	0.418	1.04	U	<	0.476	1.19	U	<	0.444	1.11	U	<	0.469	1.17	U	<	0.471	1.18	U	<	0.412	1.03	U
NMeFOSAA	-	<	0.424	1.06	U	<	0.418	1.04	U	<	0.476	1.19	U	<	0.444	1.11	U	<	0.469	1.17	U	<	0.471	1.18	U	<	0.412	1.03	U
PFBA	-	<	0.424	1.06	U	<	0.418	1.04	U	<	0.476	1.19	U	<	0.444	1.11	U	0.168	0.469	1.17	J	<	0.471	1.18	U	<	0.412	1.03	U
PFBS	1600000	0.00547	0.424	1.06	J	<	0.418	1.04	U	0.0085	0.476	1.19	J	<	0.444	1.11	U	0.027	0.469	1.17	J	<	0.471	1.18	U	0.047	0.412	1.03	J
PFDA	-	<	0.424	1.06	U	<	0.418	1.04	U	<	0.476	1.19	U	<	0.444	1.11	U	0.015	0.469	1.17	J	<	0.471	1.18	U	<	0.412	1.03	U
PFDaA	-	0.013	0.424	1.06	J	<	0.418	1.04	U	<	0.476	1.19	U	<	0.444	1.11	U	<	0.469	1.17	U	<	0.471	1.18	U	0.018	0.412	1.03	J
PFHpA	-	0.01	0.424	1.06	J	<	0.418	1.04	U	<	0.476	1.19	U	<	0.444	1.11	U	0.022	0.469	1.17	J	0.054	0.471	1.18	J	<	0.412	1.03	U
PFHxA	-	0.061	0.424	1.06	J	0.035	0.418	1.04	J	<	0.476	1.19	U	0.057	0.444	1.11	J	0.146	0.469	1.17	J	0.141	0.471	1.18	J	0.144	0.412	1.03	J
PFHxS	-	<	0.424	1.06	U	<	0.418	1.04	U	0.129	0.476	1.19	J	<	0.444	1.11	U	<	0.469	1.17	U	0.091	0.471	1.18	J	0.307	0.412	1.03	J
PFNA	-	<	0.424	1.06	U	<	0.418	1.04	U	<	0.476	1.19	U	<	0.444	1.11	U	<	0.469	1.17	U	0.037	0.471	1.18	J	0.043	0.412	1.03	J
PFOA	1600	<	0.424	1.06	U	<	0.418	1.04	U	<	0.476	1.19	U	<	0.444	1.11	U	<	0.469	1.17	U	0.083	0.471	1.18	J	<	0.412	1.03	U
PFOS	1600	<	0.424	1.06	U	<	0.418	1.04	U	0.135	0.476	1.19	J	<	0.444	1.11	U	0.12	0.469	1.17	J	0.326	0.471	1.18	J	1.92	0.412	1.03	U
PFPaA	-	<	0.424	1.06	U	<	0.418	1.04	U	<	0.476	1.19	U	<	0.444	1.11	U	0.116	0.469	1.17	J	<	0.471	1.18	U	<	0.412	1.03	U
PFTeDA	-	<	0.424	1.06	U	<	0.418	1.04	U	<	0.476	1.19	U	<	0.444	1.11	U	<	0.469	1.17	U	0.022	0.471	1.18	J	0.013	0.412	1.03	J
PFTrDA	-	<	0.424	1.06	U	<	0.418	1.04	U	<	0.476	1.19	U	<	0.444	1.11	U	<	0.469	1.17	U	<	0.471	1.18	U	<	0.412	1.03	U
PFUnDA	-	<	0.424	1.06	U	<	0.418	1.04	U	<	0.476	1.19	U	<	0.444	1.11	U	<	0.469	1.17	U	<	0.471	1.18	U	<	0.412	1.03	U

**Grey Fill** Detected concentration exceeded OSD Screening Levels

**References**

a. Assistant Secretary of Defense, 2019. Risk Based Screening Levels Calculated for PFOS, PFOA, PFBS in Groundwater or Soil using USEPA's Regional Screening Level Calculator. HQ=0.1. 15 October 2019. Soil screening levels based on industrial/commercial composite worker scenario for incidental ingestion of contaminated soil.

**Interpreted Qualifiers**

J = Estimated concentration

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**Chemical Abbreviations**

6:2 FTS	6:2 fluorotelomer sulfonate
8:2 FTS	8:2 fluorotelomer sulfonate
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PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFDaA	perfluorododecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPaA	perfluoropentanoic acid
PFTeDA	perfluorotetradecanoic acid
PFTrDA	perfluorotridecanoic acid
PFUnDA	perfluoro-n-undecanoic acid

**Acronyms and Abbreviations**

AOI	Area of Interest
DUP	Duplicate
ft	feet
HA	Hand auger
HQ	Hazard quotient
LCMSMS	Liquid Chromatography Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
OSD	Office of the Secretary of Defense
QSM	Quality Systems Manual
Qual	Interpreted Qualifier
SB	Soil boring
USEPA	United States Environmental Protection Agency
ug/Kg	micrograms per Kilogram
-	Not applicable
<	analyte not detected above the LOD

**Appendix F Laboratory Data**  
**Shallow Subsurface Soil**  
**Site Inspection Report, Fort William Henry Harrison**

Area of Interest Sample ID Sample Date Depth		AOI02																				AOI03							
		AOI2-HA6-2-4				AOI2-HA6-2-4-DUP				AOI2-SB1-9-11				AOI2-SB2-8-10				AOI02-03-SB-10-12				AOI02-03-SB-10-12-DUP				AOI3-HA1-2-4			
		02/12/2019				02/12/2019				05/21/2019				05/23/2019				10/10/2020				10/10/2020				02/12/2019			
		2 - 4 ft				2 - 4 ft				9 - 11 ft				8 - 10 ft				10 - 12 ft				10 - 12 ft				2 - 4 ft			
Analyte	OSD Screening Level <sup>a</sup>	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
Soil, PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (ug/Kg)																													
6:2 FTS	-	0.019	0.442	1.11	J	<	0.443	1.11	U	<	0.518	1.29	U	0.019	0.413	1.03	J	<	0.461	1.15	U	<	0.448	1.12	U	<	0.421	1.05	U
8:2 FTS	-	<	0.442	1.11	U	<	0.443	1.11	U	<	0.518	1.29	U	<	0.413	1.03	U	<	0.461	1.15	U	<	0.448	1.12	U	<	0.421	1.05	U
NEtFOSAA	-	<	0.442	1.11	U	<	0.443	1.11	U	<	0.518	1.29	U	<	0.413	1.03	U	<	0.461	1.15	U	<	0.448	1.12	U	<	0.421	1.05	U
NMeFOSAA	-	<	0.442	1.11	U	<	0.443	1.11	U	<	0.518	1.29	U	<	0.413	1.03	U	<	0.461	1.15	U	<	0.448	1.12	U	<	0.421	1.05	U
PFBA	-	<	0.442	1.11	U	<	0.443	1.11	U	<	0.518	1.29	U	<	0.413	1.03	U	<	0.461	1.15	U	<	0.448	1.12	U	<	0.421	1.05	U
PFBS	1600000	0.036	0.442	1.11	J	0.031	0.443	1.11	J	<	0.518	1.29	U	<	0.413	1.03	U	<	0.461	1.15	U	<	0.448	1.12	U	0.00739	0.421	1.05	J
PFDA	-	<	0.442	1.11	U	0.021	0.443	1.11	J	<	0.518	1.29	U	<	0.413	1.03	U	<	0.461	1.15	U	<	0.448	1.12	U	<	0.421	1.05	U
PFDaA	-	<	0.442	1.11	U	<	0.443	1.11	U	<	0.518	1.29	U	<	0.413	1.03	U	<	0.461	1.15	U	<	0.448	1.12	U	<	0.421	1.05	U
PFHpA	-	0.072	0.442	1.11	J	0.054	0.443	1.11	J	<	0.518	1.29	U	<	0.413	1.03	U	<	0.461	1.15	U	<	0.448	1.12	U	<	0.421	1.05	U
PFHxA	-	0.263	0.442	1.11	J	0.22	0.443	1.11	J	<	0.518	1.29	U	<	0.413	1.03	U	<	0.461	1.15	U	<	0.448	1.12	U	<	0.421	1.05	U
PFHxS	-	0.285	0.442	1.11	J	0.25	0.443	1.11	J	0.012	0.518	1.29	J	0.212	0.413	1.03	J	<	0.461	1.15	U	<	0.448	1.12	U	0.06	0.421	1.05	J
PFNA	-	0.019	0.442	1.11	J	<	0.443	1.11	U	<	0.518	1.29	U	0.00501	0.413	1.03	J	<	0.461	1.15	U	<	0.448	1.12	U	<	0.421	1.05	U
PFOA	1600	0.087	0.442	1.11	J	0.081	0.443	1.11	J	<	0.518	1.29	U	<	0.413	1.03	U	<	0.461	1.15	U	<	0.448	1.12	U	0.034	0.421	1.05	J
PFOS	1600	0.572	0.442	1.11	J	0.489	0.443	1.11	J	0.046	0.518	1.29	J	0.161	0.413	1.03	J	<	0.461	1.15	U	<	0.448	1.12	U	0.244	0.421	1.05	J
PFPeA	-	0.143	0.442	1.11	J	0.093	0.443	1.11	J	<	0.518	1.29	U	<	0.413	1.03	U	<	0.461	1.15	U	<	0.448	1.12	U	<	0.421	1.05	U
PFTeDA	-	<	0.442	1.11	U	<	0.443	1.11	U	<	0.518	1.29	U	<	0.413	1.03	U	<	0.461	1.15	U	<	0.448	1.12	U	<	0.421	1.05	U
PFTrDA	-	<	0.442	1.11	U	<	0.443	1.11	U	<	0.518	1.29	U	<	0.413	1.03	U	<	0.461	1.15	U	<	0.448	1.12	U	<	0.421	1.05	U
PFUnDA	-	<	0.442	1.11	U	<	0.443	1.11	U	<	0.518	1.29	U	<	0.413	1.03	U	<	0.461	1.15	U	<	0.448	1.12	U	<	0.421	1.05	U

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Appendix F Laboratory Data  
Shallow Subsurface Soil  
Site Inspection Report, Fort William Henry Harrison

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		AOI1-HA1-2-4				AOI1-HA2-2-4				AOI2-HA1-2-4				AOI2-HA2-2-4				AOI2-HA2-2-4-DUP				AOI2-HA3-2-4				AOI2-HA4-2-4			
		02/12/2019				02/12/2019				02/13/2019				02/13/2019				02/13/2019				02/13/2019				02/13/2019			
		2 - 4 ft				2 - 4 ft				2 - 4 ft				2 - 4 ft				2 - 4 ft				2 - 4 ft				2 - 4 ft			
Analyte	OSD Screening Level <sup>a</sup>	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
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6:2 FTS	-	0.058	0.424	1.06	J	0.041	0.418	1.04	J	<	0.476	1.19	U	0.041	0.444	1.11	J	<	0.448	1.12	U	0.046	0.469	1.17	J	0.026	0.471	1.18	J
8:2 FTS	-	<	0.424	1.06	U	<	0.418	1.04	U	<	0.476	1.19	U	<	0.444	1.11	U	<	0.448	1.12	U	<	0.469	1.17	U	<	0.471	1.18	U
NEiFOSAA	-	0.018	0.424	1.06	J	<	0.418	1.04	U	<	0.476	1.19	U	<	0.444	1.11	U	<	0.448	1.12	U	<	0.469	1.17	U	<	0.471	1.18	U
NMeFOSAA	-	<	0.424	1.06	U	<	0.418	1.04	U	<	0.476	1.19	U	<	0.444	1.11	U	<	0.448	1.12	U	<	0.469	1.17	U	<	0.471	1.18	U
PFBA	-	<	0.424	1.06	U	<	0.418	1.04	U	<	0.476	1.19	U	<	0.444	1.11	U	0.069	0.448	1.12	J	0.168	0.469	1.17	J	<	0.471	1.18	U
PFBS	1600000	0.00547	0.424	1.06	J	<	0.418	1.04	U	0.0085	0.476	1.19	J	<	0.444	1.11	U	0.00808	0.448	1.12	J	0.027	0.469	1.17	J	<	0.471	1.18	U
PFDA	-	<	0.424	1.06	U	<	0.418	1.04	U	<	0.476	1.19	U	<	0.444	1.11	U	<	0.448	1.12	U	0.015	0.469	1.17	J	<	0.471	1.18	U
PFDoA	-	0.013	0.424	1.06	J	<	0.418	1.04	U	<	0.476	1.19	U	<	0.444	1.11	U	<	0.448	1.12	U	<	0.469	1.17	U	<	0.471	1.18	U
PFHpA	-	0.01	0.424	1.06	J	<	0.418	1.04	U	<	0.476	1.19	U	<	0.444	1.11	U	0.011	0.448	1.12	J	0.022	0.469	1.17	J	0.054	0.471	1.18	J
PFHxA	-	0.061	0.424	1.06	J	0.035	0.418	1.04	J	<	0.476	1.19	U	0.057	0.444	1.11	J	<	0.448	1.12	U	0.146	0.469	1.17	J	0.141	0.471	1.18	J
PFHxS	-	<	0.424	1.06	U	<	0.418	1.04	U	0.129	0.476	1.19	J	<	0.444	1.11	U	0.011	0.448	1.12	J	<	0.469	1.17	U	0.091	0.471	1.18	J
PFNA	-	<	0.424	1.06	U	<	0.418	1.04	U	<	0.476	1.19	U	<	0.444	1.11	U	<	0.448	1.12	U	<	0.469	1.17	U	0.037	0.471	1.18	J
PFOA	1600	<	0.424	1.06	U	<	0.418	1.04	U	<	0.476	1.19	U	<	0.444	1.11	U	<	0.448	1.12	U	<	0.469	1.17	U	0.083	0.471	1.18	J
PFOS	1600	<	0.424	1.06	U	<	0.418	1.04	U	0.135	0.476	1.19	J	<	0.444	1.11	U	0.032	0.448	1.12	J	0.12	0.469	1.17	J	0.326	0.471	1.18	J
PFPeA	-	<	0.424	1.06	U	<	0.418	1.04	U	<	0.476	1.19	U	<	0.444	1.11	U	<	0.448	1.12	U	0.116	0.469	1.17	J	<	0.471	1.18	U
PFTeDA	-	<	0.424	1.06	U	<	0.418	1.04	U	<	0.476	1.19	U	<	0.444	1.11	U	<	0.448	1.12	U	<	0.469	1.17	U	0.022	0.471	1.18	J
PFTrDA	-	<	0.424	1.06	U	<	0.418	1.04	U	<	0.476	1.19	U	<	0.444	1.11	U	<	0.448	1.12	U	<	0.469	1.17	U	<	0.471	1.18	U
PFUnDA	-	<	0.424	1.06	U	<	0.418	1.04	U	<	0.476	1.19	U	<	0.444	1.11	U	<	0.448	1.12	U	<	0.469	1.17	U	<	0.471	1.18	U

Grey Fill Detected concentration exceeded OSD Screening Levels

References

a. Assistant Secretary of Defense, 2019. Risk Based Screening Levels Calculated for PFOS, PFOA, PFBS in Groundwater or Soil using USEPA's Regional Screening Level Calculator. HQ=0.1. 15 October 2019. Soil screening levels based on industrial/commercial composite worker scenario for incidental ingestion of contaminated soil.

Interpreted Qualifiers

J = Estimated concentration

U = The analyte was not detected at a level greater than or equal to the adjusted detection limit (DL)

Chemical Abbreviations

6:2 FTS	6:2 fluorotelomer sulfonate
8:2 FTS	8:2 fluorotelomer sulfonate
NEiFOSAA	N-ethyl perfluorooctane- sulfonamidoacetic acid
NMeFOSAA	N-methyl perfluorooctanesulfonamidoacetic acid
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFDoA	perfluorododecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid
PFTeDA	perfluorotetradecanoic acid
PFTrDA	perfluorotridecanoic acid
PFUnDA	perfluoro-n-undecanoic acid

Acronyms and Abbreviations

AOI	Area of Interest
DUP	Duplicate
ft	feet
HA	Hand auger
HQ	Hazard quotient
LCMSMS	Liquid Chromatography Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
OSD	Office of the Secretary of Defense
QSM	Quality Systems Manual
Qual	Interpreted Qualifier
SB	Soil boring
USEPA	United States Environmental Protection Agency
ug/Kg	micrograms per Kilogram
-	Not applicable
<	analyte not detected above the LOD

**Appendix F Laboratory Data**  
**Shallow Subsurface Soil**  
**Site Inspection Report, Fort William Henry Harrison**

Area of Interest Sample ID Sample Date Depth		AOI02																											
		AOI2-HA5-2-4				AOI2-HA6-2-4				AOI2-HA6-2-4-DUP				AOI2-SB1-9-11				AOI2-SB2-8-10				AOI02-03-SB-10-12				AOI02-03-SB-10-12-DUP			
		02/13/2019				02/12/2019				02/12/2019				05/21/2019				05/23/2019				10/10/2020				10/10/2020			
		2 - 4 ft				2 - 4 ft				2 - 4 ft				9 - 11 ft				8 - 10 ft				10 - 12 ft				10 - 12 ft			
Analyte	OSD Screening Level <sup>a</sup>	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
Soil, PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (ug/Kg)																													
6:2 FTS	-	<	0.412	1.03	U	0.019	0.442	1.11	J	<	0.443	1.11	U	<	0.518	1.29	U	0.019	0.413	1.03	J	<	0.461	1.15	U	<	0.448	1.12	U
8:2 FTS	-	<	0.412	1.03	U	<	0.442	1.11	U	<	0.443	1.11	U	<	0.518	1.29	U	<	0.413	1.03	U	<	0.461	1.15	U	<	0.448	1.12	U
NEtFOSAA	-	<	0.412	1.03	U	<	0.442	1.11	U	<	0.443	1.11	U	<	0.518	1.29	U	<	0.413	1.03	U	<	0.461	1.15	U	<	0.448	1.12	U
NMeFOSAA	-	<	0.412	1.03	U	<	0.442	1.11	U	<	0.443	1.11	U	<	0.518	1.29	U	<	0.413	1.03	U	<	0.461	1.15	U	<	0.448	1.12	U
PFBA	-	<	0.412	1.03	U	<	0.442	1.11	U	<	0.443	1.11	U	<	0.518	1.29	U	<	0.413	1.03	U	<	0.461	1.15	U	<	0.448	1.12	U
PFBS	1600000	0.047	0.412	1.03	J	0.036	0.442	1.11	J	0.031	0.443	1.11	J	<	0.518	1.29	U	<	0.413	1.03	U	<	0.461	1.15	U	<	0.448	1.12	U
PFDA	-	<	0.412	1.03	U	<	0.442	1.11	U	0.021	0.443	1.11	J	<	0.518	1.29	U	<	0.413	1.03	U	<	0.461	1.15	U	<	0.448	1.12	U
PFDaA	-	0.018	0.412	1.03	J	<	0.442	1.11	U	<	0.443	1.11	U	<	0.518	1.29	U	<	0.413	1.03	U	<	0.461	1.15	U	<	0.448	1.12	U
PFHpA	-	<	0.412	1.03	U	0.072	0.442	1.11	J	0.054	0.443	1.11	J	<	0.518	1.29	U	<	0.413	1.03	U	<	0.461	1.15	U	<	0.448	1.12	U
PFHxA	-	0.144	0.412	1.03	J	0.263	0.442	1.11	J	0.22	0.443	1.11	J	<	0.518	1.29	U	<	0.413	1.03	U	<	0.461	1.15	U	<	0.448	1.12	U
PFHxS	-	0.307	0.412	1.03	J	0.285	0.442	1.11	J	0.25	0.443	1.11	J	0.012	0.518	1.29	J	0.212	0.413	1.03	J	<	0.461	1.15	U	<	0.448	1.12	U
PFNA	-	0.043	0.412	1.03	J	0.019	0.442	1.11	J	<	0.443	1.11	U	<	0.518	1.29	U	0.00501	0.413	1.03	J	<	0.461	1.15	U	<	0.448	1.12	U
PFOA	1600	<	0.412	1.03	U	0.087	0.442	1.11	J	0.081	0.443	1.11	J	<	0.518	1.29	U	<	0.413	1.03	U	<	0.461	1.15	U	<	0.448	1.12	U
PFOS	1600	1.92	0.412	1.03	J	0.572	0.442	1.11	J	0.489	0.443	1.11	J	0.046	0.518	1.29	J	0.161	0.413	1.03	J	<	0.461	1.15	U	<	0.448	1.12	U
PFPeA	-	<	0.412	1.03	U	0.143	0.442	1.11	J	0.093	0.443	1.11	J	<	0.518	1.29	U	<	0.413	1.03	U	<	0.461	1.15	U	<	0.448	1.12	U
PFTeDA	-	0.013	0.412	1.03	J	<	0.442	1.11	U	<	0.443	1.11	U	<	0.518	1.29	U	<	0.413	1.03	U	<	0.461	1.15	U	<	0.448	1.12	U
PFTrDA	-	<	0.412	1.03	U	<	0.442	1.11	U	<	0.443	1.11	U	<	0.518	1.29	U	<	0.413	1.03	U	<	0.461	1.15	U	<	0.448	1.12	U
PFUnDA	-	<	0.412	1.03	U	<	0.442	1.11	U	<	0.443	1.11	U	<	0.518	1.29	U	<	0.413	1.03	U	<	0.461	1.15	U	<	0.448	1.12	U

**Grey Fill** Detected concentration exceeded OSD Screening Levels

**References**

a. Assistant Secretary of Defense, 2019. Risk Based Screening Levels Calculated for PFOS, PFOA, PFBS in Groundwater or Soil using USEPA's Regional Screening Level Calculator. HQ=0.1. 15 October 2019. Soil screening levels based on industrial/commercial composite worker scenario for incidental ingestion of contaminated soil.

**Interpreted Qualifiers**

J = Estimated concentration

U = The analyte was not detected at a level greater than or equal to the adjusted detection limit (DL)

**Chemical Abbreviations**

6:2 FTS	6:2 fluorotelomer sulfonate
8:2 FTS	8:2 fluorotelomer sulfonate
NEtFOSAA	N-ethyl perfluorooctane- sulfonamidoacetic acid
NMeFOSAA	N-methyl perfluorooctanesulfonamidoacetic acid
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFDaA	perfluorododecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPaA	perfluoropentanoic acid
PFTeDA	perfluorotetradecanoic acid
PFTrDA	perfluorotridecanoic acid
PFUnDA	perfluoro-n-undecanoic acid

**Acronyms and Abbreviations**

AOI	Area of Interest
DUP	Duplicate
ft	feet
HA	Hand auger
HQ	Hazard quotient
LCMSMS	Liquid Chromatography Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
OSD	Office of the Secretary of Defense
QSM	Quality Systems Manual
Qual	Interpreted Qualifier
SB	Soil boring
USEPA	United States Environmental Protection Agency
ug/Kg	micrograms per Kilogram
-	Not applicable
<	analyte not detected above the LOD



**Appendix F Laboratory Data  
Shallow Subsurface Soil  
Site Inspection Report, Fort William Henry Harrison**

Area of Interest		AOI03			
Sample ID		AOI3-HA1-2-4			
Sample Date		02/12/2019			
Depth		2 - 4 ft			
Analyte	OSD Screening Level *	Result	LOD	LOQ	Qual
<b>Soil, PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (ug/Kg)</b>					
6:2 FTS	-	<	0.421	1.05	U
8:2 FTS	-	<	0.421	1.05	U
NEtFOSAA	-	<	0.421	1.05	U
NMeFOSAA	-	<	0.421	1.05	U
PFBA	-	<	0.421	1.05	U
PFBS	1600000	0.00739	0.421	1.05	J
PFDA	-	<	0.421	1.05	U
PFDoA	-	<	0.421	1.05	U
PFHpA	-	<	0.421	1.05	U
PFHxA	-	<	0.421	1.05	U
PFHxS	-	0.06	0.421	1.05	J
PFNA	-	<	0.421	1.05	U
PFOA	1600	0.034	0.421	1.05	J
PFOS	1600	0.244	0.421	1.05	J
PFPeA	-	<	0.421	1.05	U
PFTeDA	-	<	0.421	1.05	U
PFTrDA	-	<	0.421	1.05	U
PFUnDA	-	<	0.421	1.05	U

**Grey Fill** Detected concentration exceeded OSD Screening Levels

References

a. Assistant Secretary of Defense, 2019. Risk Based Screening Levels Calculated for PFOS, PFOA, PFBS in Groundwater or Soil using USEPA's Regional Screening Level Calculator. HQ=0.1. 15 October 2019. Soil screening levels based on industrial/commercial composite worker scenario for incidental ingestion of contaminated soil.

Interpreted Qualifiers

J = Estimated concentration

U = The analyte was not detected at a level greater than or equal to the adjusted detection limit (DL)

Chemical Abbreviations

6:2 FTS	6:2 fluorotelomer sulfonate
8:2 FTS	8:2 fluorotelomer sulfonate
NEtFOSAA	N-ethyl perfluorooctane- sulfonamidoacetic acid
NMeFOSAA	N-methyl perfluorooctanesulfonamidoacetic acid
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFDoA	perfluorododecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid
PFTeDA	perfluorotetradecanoic acid
PFTrDA	perfluorotridecanoic acid
PFUnDA	perfluoro-n-undecanoic acid

Acronyms and Abbreviations

AOI	Area of Interest
DUP	Duplicate
ft	feet
HA	Hand auger
HQ	Hazard quotient
LCMSMS	Liquid Chromatography Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
OSD	Office of the Secretary of Defense
QSM	Quality Systems Manual
Qual	Interpreted Qualifier
SB	Soil boring
USEPA	United States Environmental Protection Agency
ug/Kg	micrograms per Kilogram
-	Not applicable
<	analyte not detected above the LOD

Appendix F Laboratory Data  
Surface Soil  
Site Inspection Report, Fort William Henry Harrison

Area of Interest Sample ID Sample Date Depth		AOI01																											
		AOI1-HA1-0-2				AOI1-HA2-0-2				AOI1-SB1-0-2				AOI1-SB2-0-2				AOI1-SB3-0-2				AOI01-04-SB-00-02				AOI01-05-SB-00-02			
		02/12/2019				02/12/2019				02/13/2019				02/15/2019				02/20/2019				10/07/2020				10/06/2020			
		0 - 2 ft				0 - 2 ft				0 - 2 ft				0 - 2 ft				0 - 2 ft				0 - 2 ft				0 - 2 ft			
Analyte	OSD Screening Level <sup>a</sup>	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
Soil, PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (ug/Kg)																													
6:2 FTS	-	0.043	0.43	1.08	J	0.043	0.422	1.05	X	<	0.410	1.02	U	<	0.418	1.05	U	<	0.409	1.02	U	<	0.403	1.01	U	<	0.418	1.05	U
8:2 FTS	-	<	0.43	1.08	U	<	0.422	1.05	UX	<	0.410	1.02	U	<	0.418	1.05	U	0.015	0.409	1.02	J	<	0.403	1.01	U	<	0.418	1.05	U
NEiFOSAA	-	<	0.43	1.08	U	<	0.422	1.05	UX	<	0.410	1.02	U	<	0.418	1.05	U	0.011	0.409	1.02	J	<	0.403	1.01	U	<	0.418	1.05	U
NMeFOSAA	-	<	0.43	1.08	U	<	0.422	1.05	UX	<	0.410	1.02	U	<	0.418	1.05	U	<	0.409	1.02	U	<	0.403	1.01	U	<	0.418	1.05	U
PFBA	-	<	0.43	1.08	U	<	0.422	1.05	UX	<	0.410	1.02	U	0.305	0.418	1.05	J	<	0.409	1.02	U	<	0.403	1.01	U	<	0.418	1.05	U
PFBS	130000	<	0.43	1.08	U	<	0.422	1.05	UX	<	0.410	1.02	U	0.104	0.418	1.05	J	0.012	0.409	1.02	J	<	0.403	1.01	U	<	0.418	1.05	U
PFDA	-	<	0.43	1.08	U	<	0.422	1.05	UX	<	0.410	1.02	U	<	0.418	1.05	U	<	0.409	1.02	U	<	0.403	1.01	U	<	0.418	1.05	U
PFDaA	-	<	0.43	1.08	U	<	0.422	1.05	UX	<	0.410	1.02	U	<	0.418	1.05	U	<	0.409	1.02	U	<	0.403	1.01	U	<	0.418	1.05	U
PFHpA	-	0.015	0.43	1.08	J	<	0.422	1.05	UX	<	0.410	1.02	U	0.163	0.418	1.05	J	0.043	0.409	1.02	J	<	0.403	1.01	U	<	0.418	1.05	U
PFHxA	-	0.197	0.43	1.08	J	0.068	0.422	1.05	X	0.03	0.410	1.02	J	0.618	0.418	1.05	J	<	0.409	1.02	U	<	0.403	1.01	U	<	0.418	1.05	U
PFHxS	-	<	0.43	1.08	U	<	0.422	1.05	UX	<	0.410	1.02	U	7.97	0.418	1.05		0.103	0.409	1.02	J	<	0.403	1.01	U	<	0.418	1.05	U
PFNA	-	<	0.43	1.08	U	<	0.422	1.05	UX	<	0.410	1.02	U	<	0.418	1.05	U	0.032	0.409	1.02	J	<	0.403	1.01	U	<	0.418	1.05	U
PFOA	130	<	0.43	1.08	U	<	0.422	1.05	UX	<	0.410	1.02	U	<	0.418	1.05	U	0.122	0.409	1.02	J	<	0.403	1.01	U	<	0.418	1.05	U
PFOS	130	<	0.43	1.08	U	<	0.422	1.05	UX	<	0.410	1.02	U	0.751	0.418	1.05	J	0.664	0.409	1.02	J	<	0.403	1.01	U	<	0.418	1.05	U
PFPeA	-	0.102	0.43	1.08	J	<	0.422	1.05	UX	<	0.410	1.02	U	0.364	0.418	1.05	J	0.087	0.409	1.02	J	<	0.403	1.01	U	<	0.418	1.05	U
PFTeDA	-	<	0.43	1.08	U	<	0.422	1.05	UX	<	0.410	1.02	U	<	0.418	1.05	U	0.015	0.409	1.02	J	<	0.403	1.01	U	<	0.418	1.05	U
PFTrDA	-	<	0.43	1.08	U	<	0.422	1.05	UX	<	0.410	1.02	U	<	0.418	1.05	U	0.00995	0.409	1.02	J	<	0.403	1.01	U	<	0.418	1.05	U
PFUnDA	-	<	0.43	1.08	U	<	0.422	1.05	UX	<	0.410	1.02	U	<	0.418	1.05	U	0.013	0.409	1.02	J	<	0.403	1.01	U	<	0.418	1.05	U

Grey Fill Detected concentration exceeded OSD Screening Levels

References

a. Assistant Secretary of Defense, 2019. Risk Based Screening Levels Calculated for PFOS, PFOA, PFBS in Groundwater or Soil using USEPA's Regional Screening Level Calculator. HQ=0.1. 15 October 2019. Soil screening levels based on residential scenario for direct ingestion of contaminated soil.

Interpreted Qualifiers

J = Estimated concentration

J+ = Estimated concentration, biased high

U = The analyte was not detected at a level greater than or equal to the adjusted detection limit (DL)

UJ = The analyte was not detected at a level greater than or equal to the adjusted DL. However, the reported adjusted DL is approximate and may be inaccurate or imprecise.

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Chemical Abbreviations

6:2 FTS	6:2 fluorotelomer sulfonate
8:2 FTS	8:2 fluorotelomer sulfonate
NEiFOSAA	N-ethyl perfluorooctane- sulfonamidoacetic acid
NMeFOSAA	N-methyl perfluorooctanesulfonamidoacetic acid
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFDaA	perfluorododecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid
PFTeDA	perfluorotetradecanoic acid
PFTrDA	perfluorotridecanoic acid
PFUnDA	perfluoro-n-undecanoic acid

Acronyms and Abbreviations

AOI	Area of Interest
DUP	Duplicate
ft	feet
HA	Hand auger
HQ	Hazard quotient
LCMSMS	Liquid Chromatography Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
OSD	Office of the Secretary of Defense
QSM	Quality Systems Manual
Qual	Interpreted Qualifier
RE	Re-extracted
SB	Soil boring
SS	Surface Soil
USEPA	United States Environmental Protection Agency
ug/Kg	micrograms per Kilogram
-	Not applicable
<	analyte not detected above the LOD

Appendix F Laboratory Data  
Surface Soil  
Site Inspection Report, Fort William Henry Harrison

Area of Interest Sample ID Sample Date Depth		AOI01																											
		AOI01-06-SB-00-02				AOI1-SS1-0-2				AOI1-SS1-0-2R				AOI1-SS2-0-2				AOI1-SS3-0-2				AOI1-SS3-0-2 (RE)				AOI1-SS4-0-2			
		10/06/2020				02/14/2019				05/20/2019				02/14/2019				02/14/2019				02/14/2019				02/14/2019			
		0 - 2 ft				0 - 2 ft				0 - 2 ft				0 - 2 ft				0 - 2 ft				0 - 2 ft				0 - 2 ft			
Analyte	OSD Screening Level <sup>a</sup>	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
Soil, PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (ug/Kg)																													
6:2 FTS	-	<	0.474	1.19	U	<	0.409	1.02	U	<	0.480	1.20	U	<	0.429	1.07	U	<	0.425	1.06	U	-	-	-	-	<	0.425	1.06	UJ
8:2 FTS	-	<	0.474	1.19	U	<	0.409	1.02	U	<	0.480	1.20	U	<	0.429	1.07	U	<	0.425	1.06	U	-	-	-	-	<	0.425	1.06	UJ
NEiFOSAA	-	<	0.474	1.19	U	<	0.409	1.02	U	<	0.480	1.20	U	<	0.429	1.07	U	<	0.425	1.06	U	-	-	-	-	<	0.425	1.06	UJ
NMeFOSAA	-	<	0.474	1.19	U	<	0.409	1.02	U	<	0.480	1.20	U	<	0.429	1.07	U	<	0.425	1.06	U	-	-	-	-	<	0.425	1.06	UJ
PFBA	-	1.42	0.474	1.19	<	0.409	1.02	U	0.051	0.480	1.20	J	<	0.429	1.07	U	<	0.425	1.06	U	-	-	-	-	0.029	0.425	1.06	J	
PFBS	130000	<	0.474	1.19	U	<	0.409	1.02	U	<	0.480	1.20	U	<	0.429	1.07	U	<	0.425	1.06	U	-	-	-	-	<	0.425	1.06	UJ
PFDA	-	<	0.474	1.19	U	<	0.409	1.02	U	0.021	0.480	1.20	J	<	0.429	1.07	U	-	-	-	-	0.034	0.427	1.07	J	<	0.425	1.06	UJ
PFDaA	-	<	0.474	1.19	U	<	0.409	1.02	U	0.00951	0.480	1.20	J	<	0.429	1.07	U	<	0.425	1.06	U	-	-	-	-	<	0.425	1.06	UJ
PFHpA	-	<	0.474	1.19	U	<	0.409	1.02	U	0.018	0.480	1.20	J	<	0.429	1.07	U	0.018	0.425	1.06	J	-	-	-	-	<	0.425	1.06	UJ
PFHxA	-	<	0.474	1.19	U	<	0.409	1.02	U	<	0.480	1.20	U	<	0.429	1.07	U	0.092	0.425	1.06	J	-	-	-	-	0.064	0.425	1.06	J
PFHxS	-	<	0.474	1.19	U	<	0.409	1.02	U	0.011	0.480	1.20	J	<	0.429	1.07	U	0.252	0.425	1.06	J	-	-	-	-	<	0.425	1.06	UJ
PFNA	-	<	0.474	1.19	U	<	0.409	1.02	U	0.066	0.480	1.20	J	<	0.429	1.07	U	0.01	0.425	1.06	J	-	-	-	-	<	0.425	1.06	UJ
PFOA	130	<	0.474	1.19	U	<	0.409	1.02	U	0.069	0.480	1.20	J	<	0.429	1.07	U	0.064	0.425	1.06	J	-	-	-	-	<	0.425	1.06	UJ
PFOS	130	<	0.477	1.19	U	0.082	0.409	1.02	J	0.386	0.480	1.20	J	<	0.429	1.07	U	0.249	0.425	1.06	J	-	-	-	-	<	0.425	1.06	UJ
PFPeA	-	<	0.474	1.19	U	<	0.409	1.02	U	<	0.480	1.20	U	<	0.429	1.07	U	-	-	-	-	0.0099	0.427	1.07	J	<	0.425	1.06	UJ
PFTeDA	-	<	0.474	1.19	U	<	0.409	1.02	U	<	0.480	1.20	U	<	0.429	1.07	U	<	0.425	1.06	U	-	-	-	-	<	0.425	1.06	UJ
PFTrDA	-	<	0.474	1.19	U	<	0.409	1.02	U	<	0.480	1.20	U	<	0.429	1.07	U	<	0.425	1.06	U	-	-	-	-	<	0.425	1.06	UJ
PFUnDA	-	<	0.474	1.19	U	<	0.409	1.02	U	0.011	0.480	1.20	J	<	0.429	1.07	U	<	0.425	1.06	U	-	-	-	-	<	0.425	1.06	UJ

Grey Fill Detected concentration exceeded OSD Screening Levels

References

a. Assistant Secretary of Defense, 2019. Risk Based Screening Levels Calculated for PFOS, PFOA, PFBS in Groundwater or Soil using USEPA's Regional Screening Level Calculator. HQ=0.1. 15 October 2019. Soil screening levels based on residential scenario for direct ingestion of contaminated soil.

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PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
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Appendix F Laboratory Data  
Surface Soil  
Site Inspection Report, Fort William Henry Harrison

Area of Interest Sample ID Sample Date Depth		AOI01																											
		AOI1-SS5-0-2				AOI1-SS6-0-2				AOI01-SS7-00-02				AOI01-SS8-00-02				AOI01-SS9-00-02				AOI01-SS10-00-02				AOI01-SS11-00-02			
		02/14/2019				02/20/2019				10/07/2020				10/06/2020				10/06/2020				10/06/2020				10/07/2020			
		0 - 2 ft				0 - 2 ft				0 - 2 ft				0 - 2 ft				0 - 2 ft				0 - 2 ft				0 - 2 ft			
Analyte	OSD Screening Level <sup>a</sup>	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
Soil, PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (ug/Kg)																													
6:2 FTS	-	<	0.430	1.07	U	<	0.496	1.24	U	<	0.392	0.980	U	<	0.441	1.10	U	<	0.419	1.05	U	<	0.413	1.03	U	<	0.408	1.02	U
8:2 FTS	-	<	0.430	1.07	U	<	0.496	1.24	U	<	0.392	0.980	U	<	0.441	1.10	U	<	0.419	1.05	U	<	0.413	1.03	U	<	0.408	1.02	U
NEtFOSAA	-	0.014	0.430	1.07	J	<	0.496	1.24	U	<	0.392	0.980	U	<	0.441	1.10	U	<	0.419	1.05	U	<	0.413	1.03	U	<	0.408	1.02	U
NMeFOSAA	-	<	0.430	1.07	U	<	0.496	1.24	U	<	0.392	0.980	U	<	0.441	1.10	U	<	0.419	1.05	U	<	0.413	1.03	U	<	0.408	1.02	U
PFBA	-	<	0.430	1.07	U	<	0.496	1.24	U	<	0.392	0.980	U	<	0.441	1.10	U	<	0.419	1.05	U	<	0.413	1.03	U	0.205	0.408	1.02	J
PFBS	130000	<	0.430	1.07	U	0.010	0.496	1.24	J	<	0.392	0.980	U	<	0.441	1.10	U	<	0.419	1.05	U	<	0.413	1.03	U	1.08	0.408	1.02	
PFDA	-	<	0.430	1.07	U	<	0.496	1.24	U	<	0.392	0.980	U	<	0.441	1.10	U	<	0.419	1.05	U	<	0.413	1.03	U	<	0.408	1.02	U
PFDaA	-	<	0.430	1.07	U	0.016	0.496	1.24	J	<	0.392	0.980	U	<	0.441	1.10	U	<	0.419	1.05	U	<	0.413	1.03	U	<	0.408	1.02	U
PFHpA	-	0.023	0.430	1.07	J	0.026	0.496	1.24	J	<	0.392	0.980	U	<	0.441	1.10	U	<	0.419	1.05	U	<	0.413	1.03	U	<	0.408	1.02	U
PFHxA	-	<	0.430	1.07	U	<	0.496	1.24	U	<	0.392	0.980	U	<	0.441	1.10	U	<	0.419	1.05	U	<	0.413	1.03	U	0.769	0.408	1.02	J
PFHxS	-	0.058	0.430	1.07	J	0.068	0.496	1.24	J	<	0.392	0.980	U	<	0.441	1.10	U	<	0.419	1.05	U	<	0.413	1.03	U	4.38	0.408	1.02	
PFNA	-	0.065	0.430	1.07	J	<	0.496	1.24	U	<	0.392	0.980	U	<	0.441	1.10	U	<	0.419	1.05	U	<	0.413	1.03	U	<	0.408	1.02	U
PFOA	130	0.106	0.430	1.07	J	0.089	0.496	1.24	J	<	0.392	0.980	U	<	0.441	1.10	U	<	0.419	1.05	U	<	0.413	1.03	U	0.166	0.408	1.02	J
PFOS	130	2.23	0.430	1.07		0.822	0.496	1.24	J	0.630	0.392	0.980	J	<	0.441	1.10	U	<	0.419	1.05	U	<	0.413	1.03	U	39.9	2.04	5.11	
PFPeA	-	0.039	0.430	1.07	J	0.043	0.496	1.24	J	<	0.392	0.980	U	<	0.441	1.10	U	<	0.419	1.05	U	<	0.413	1.03	U	0.180	0.408	1.02	J
PFTeDA	-	<	0.430	1.07	U	0.015	0.496	1.24	J	<	0.392	0.980	U	<	0.441	1.10	U	<	0.419	1.05	U	<	0.413	1.03	U	<	0.408	1.02	U
PFTrDA	-	<	0.430	1.07	U	<	0.496	1.24	U	<	0.392	0.980	U	<	0.441	1.10	U	<	0.419	1.05	U	<	0.413	1.03	U	<	0.408	1.02	U
PFUnDA	-	<	0.430	1.07	U	0.018	0.496	1.24	J	<	0.392	0.980	U	<	0.441	1.10	U	<	0.419	1.05	U	<	0.413	1.03	U	<	0.408	1.02	U

Grey Fill Detected concentration exceeded OSD Screening Levels

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PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid
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ug/Kg	micrograms per Kilogram
-	Not applicable
<	analyte not detected above the LOD



Appendix F Laboratory Data  
Surface Soil  
Site Inspection Report, Fort William Henry Harrison

Area of Interest Sample ID Sample Date Depth		AOI01																AOI02											
		AOI01-SS12-00-02				AOI01-SS13-00-02				AOI01-SS14-00-02				AOI01-SS15-00-02				AOI2-HA1-0-2				AOI2-HA2-0-2				AOI2-HA3-0-2			
		10/07/2020				10/07/2020				10/07/2020				10/07/2020				02/13/2019				02/13/2019				02/13/2019			
		0 - 2 ft				0 - 2 ft				0 - 2 ft				0 - 2 ft				0 - 2 ft				0 - 2 ft				0 - 2 ft			
Analyte	OSD Screening Level <sup>a</sup>	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
Soil, PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (ug/Kg)																													
6:2 FTS	-	<	0.415	1.04	U	<	0.414	1.03	U	<	0.427	1.07	U	<	0.413	1.03	U	<	0.474	1.18	U	0.059	0.436	1.09	J	0.044	0.45	1.13	J
8:2 FTS	-	<	0.415	1.04	U	<	0.414	1.03	U	<	0.427	1.07	U	<	0.413	1.03	U	<	0.474	1.18	U	<	0.436	1.09	U	<	0.45	1.13	U
NEtFOSAA	-	<	0.415	1.04	U	<	0.414	1.03	U	<	0.427	1.07	U	<	0.413	1.03	U	<	0.474	1.18	U	<	0.436	1.09	U	<	0.45	1.13	U
NMeFOSAA	-	<	0.415	1.04	U	<	0.414	1.03	U	<	0.427	1.07	U	<	0.413	1.03	U	<	0.474	1.18	U	<	0.436	1.09	U	<	0.45	1.13	U
PFBA	-	<	0.415	1.04	U	<	0.414	1.03	U	<	0.427	1.07	U	<	0.413	1.03	U	<	0.474	1.18	U	<	0.436	1.09	U	<	0.45	1.13	U
PFBS	130000	<	0.415	1.04	U	<	0.414	1.03	U	<	0.427	1.07	U	<	0.413	1.03	U	<	0.474	1.18	U	<	0.436	1.09	U	0.059	0.45	1.13	J
PFDA		<	0.415	1.04	U	<	0.414	1.03	U	<	0.427	1.07	U	<	0.413	1.03	U	0.026	0.474	1.18	J	<	0.436	1.09	U	<	0.45	1.13	U
PFDaA	-	<	0.415	1.04	U	<	0.414	1.03	U	<	0.427	1.07	U	<	0.413	1.03	U	<	0.474	1.18	U	<	0.436	1.09	U	<	0.45	1.13	U
PFHpA	-	<	0.415	1.04	U	<	0.414	1.03	U	<	0.427	1.07	U	<	0.413	1.03	U	0.018	0.474	1.18	J	<	0.436	1.09	U	0.029	0.45	1.13	J
PFHxA	-	<	0.415	1.04	U	<	0.414	1.03	U	<	0.427	1.07	U	<	0.413	1.03	U	0.066	0.474	1.18	J	0.029	0.436	1.09	J	0.151	0.45	1.13	J
PFHxS	-	<	0.415	1.04	U	<	0.414	1.03	U	<	0.427	1.07	U	<	0.413	1.03	U	0.042	0.474	1.18	J	0.025	0.436	1.09	J	0.118	0.45	1.13	J
PFNA	-	<	0.415	1.04	U	<	0.414	1.03	U	<	0.427	1.07	U	<	0.413	1.03	U	<	0.474	1.18	U	<	0.436	1.09	U	<	0.45	1.13	U
PFOA	130	<	0.415	1.04	U	<	0.414	1.03	U	<	0.427	1.07	U	<	0.413	1.03	U	<	0.474	1.18	U	<	0.436	1.09	U	<	0.45	1.13	U
PFOS	130	<	0.415	1.04	U	2.11	0.414	1.03		0.872	0.427	1.07	J	1.03	0.413	1.03		0.217	0.474	1.18	J	0.086	0.436	1.09	J	0.233	0.45	1.13	J
PFPeA	-	<	0.415	1.04	U	<	0.414	1.03	U	<	0.427	1.07	U	<	0.413	1.03	U	<	0.474	1.18	U	<	0.436	1.09	U	<	0.45	1.13	U
PFTeDA	-	<	0.415	1.04	U	<	0.414	1.03	U	<	0.427	1.07	U	<	0.413	1.03	U	<	0.474	1.18	U	<	0.436	1.09	U	<	0.45	1.13	U
PFTTrDA	-	<	0.415	1.04	U	<	0.414	1.03	U	<	0.427	1.07	U	<	0.413	1.03	U	<	0.474	1.18	U	<	0.436	1.09	U	<	0.45	1.13	U
PFUnDA	-	<	0.415	1.04	U	<	0.414	1.03	U	<	0.427	1.07	U	<	0.413	1.03	U	<	0.474	1.18	U	<	0.436	1.09	U	<	0.45	1.13	U

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8:2 FTS	8:2 fluorotelomer sulfonate
NEtFOSAA	N-ethyl perfluorooctane- sulfonamidoacetic acid
NMeFOSAA	N-methyl perfluorooctanesulfonamidoacetic acid
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFDaA	perfluorododecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid
PFTeDA	perfluorotetradecanoic acid
PFTrDA	perfluorotridecanoic acid
PFUnDA	perfluoro-n-undecanoic acid

Acronyms and Abbreviations

AOI	Area of Interest
DUP	Duplicate
ft	feet
HA	Hand auger
HQ	Hazard quotient
LCMSMS	Liquid Chromatography Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
OSD	Office of the Secretary of Defense
QSM	Quality Systems Manual
Qual	Interpreted Qualifier
RE	Re-extracted
SB	Soil boring
SS	Surface Soil
USEPA	United States Environmental Protection Agency
ug/Kg	micrograms per Kilogram
-	Not applicable
<	analyte not detected above the LOD

Appendix F Laboratory Data  
Surface Soil  
Site Inspection Report, Fort William Henry Harrison

Area of Interest Sample ID Sample Date Depth		AOI02																											
		AOI2-HA4-0-2				AOI2-HA5-0-2				AOI2-HA6-0-2				AOI2-SB1-0-2				AOI2-SB2-0-2				AOI2-SB2-0-2-DUP				AOI02-03-SB-00-02			
		02/13/2019				02/13/2019				02/12/2019				05/21/2019				05/23/2019				05/23/2019				10/06/2020			
		0 - 2 ft				0 - 2 ft				0 - 2 ft				0 - 2 ft				0 - 2 ft				0 - 2 ft							
Analyte	OSD Screening Level <sup>a</sup>	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
Soil, PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (ug/Kg)																													
6:2 FTS	-	<	0.422	1.06	U	<	0.464	1.16	U	<	0.452	1.13	U	0.022	0.500	1.25	J	0.027	0.421	1.05	J	<	0.448	1.12	U	<	0.425	1.06	U
8:2 FTS	-	<	0.422	1.06	U	<	0.464	1.16	U	<	0.452	1.13	U	<	0.500	1.25	U	0.014	0.421	1.05	J	<	0.448	1.12	U	<	0.425	1.06	U
NEiFOSAA	-	<	0.422	1.06	U	<	0.464	1.16	U	<	0.452	1.13	U	<	0.500	1.25	U	0.013	0.421	1.05	J	<	0.448	1.12	U	<	0.425	1.06	U
NMeFOSAA	-	<	0.422	1.06	U	<	0.464	1.16	U	<	0.452	1.13	U	<	0.500	1.25	U	<	0.421	1.05	U	<	0.448	1.12	U	<	0.425	1.06	U
PFBA	-	<	0.422	1.06	U	<	0.464	1.16	U	<	0.452	1.13	U	0.212	0.500	1.25	J	<	0.421	1.05	U	0.051	0.448	1.12	J	<	0.425	1.06	U
PFBS	130000	<	0.422	1.06	U	0.057	0.464	1.16	J	0.07	0.452	1.13	J	0.039	0.500	1.25	J	<	0.421	1.05	U	<	0.448	1.12	U	<	0.425	1.06	U
PFDA	-	<	0.422	1.06	U	0.035	0.464	1.16	J	<	0.452	1.13	U	0.041	0.500	1.25	J	0.08	0.421	1.05	J	<	0.448	1.12	U	<	0.425	1.06	U
PFDaA	-	<	0.422	1.06	U	0.013	0.464	1.16	J	<	0.452	1.13	U	<	0.500	1.25	U	0.026	0.421	1.05	J	<	0.448	1.12	U	<	0.425	1.06	U
PFHpA	-	0.02	0.422	1.06	J	0.066	0.464	1.16	J	0.124	0.452	1.13	J	0.145	0.500	1.25	J	0.018	0.421	1.05	J	0.055	0.448	1.12	J	<	0.425	1.06	U
PFHxA	-	0.053	0.422	1.06	J	0.179	0.464	1.16	J	0.351	0.452	1.13	J	0.392	0.500	1.25	J	<	0.421	1.05	U	0.096	0.448	1.12	J	<	0.425	1.06	U
PFHxS	-	0.05	0.422	1.06	J	0.628	0.464	1.16	J	2.27	0.452	1.13	J	0.684	0.500	1.25	J	0.131	0.421	1.05	J	0.289	0.448	1.12	J	<	0.425	1.06	U
PFNA	-	0.013	0.422	1.06	J	<	0.464	1.16	U	0.074	0.452	1.13	J	0.084	0.500	1.25	J	0.035	0.421	1.05	J	0.141	0.448	1.12	J	<	0.425	1.06	U
PFOA	130	0.042	0.422	1.06	J	0.126	0.464	1.16	J	0.265	0.452	1.13	J	0.271	0.500	1.25	J	0.042	0.421	1.05	J	0.135	0.448	1.12	J	<	0.425	1.06	U
PFOS	130	0.407	0.422	1.06	J	1.73	0.464	1.16	J	10.9	0.452	1.13	J	4.14	0.500	1.25	J	4.31	0.421	1.05	J	22	0.448	1.12	J	0.602	0.425	1.06	J
PFPeA	-	<	0.422	1.06	U	<	0.464	1.16	U	0.154	0.452	1.13	J	0.228	0.500	1.25	J	<	0.421	1.05	U	<	0.448	1.12	U	<	0.425	1.06	U
PFTeDA	-	<	0.422	1.06	U	0.016	0.464	1.16	J	<	0.452	1.13	U	<	0.500	1.25	U	0.014	0.421	1.05	J	<	0.448	1.12	U	<	0.425	1.06	U
PFTTrDA	-	<	0.422	1.06	U	<	0.464	1.16	U	<	0.452	1.13	U	<	0.500	1.25	U	<	0.421	1.05	U	<	0.448	1.12	U	<	0.425	1.06	U
PFUnDA	-	<	0.422	1.06	U	<	0.464	1.16	U	<	0.452	1.13	U	0.015	0.500	1.25	J	0.022	0.421	1.05	J	<	0.448	1.12	U	<	0.425	1.06	U

Grey Fill Detected concentration exceeded OSD Screening Levels

References

a. Assistant Secretary of Defense, 2019. Risk Based Screening Levels Calculated for PFOS, PFOA, PFBS in Groundwater or Soil using USEPA's Regional Screening Level Calculator. HQ-0.1. 15 October 2019. Soil screening levels based on residential scenario for direct ingestion of contaminated soil.

Interpreted Qualifiers

J = Estimated concentration

J+ = Estimated concentration, biased high

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PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluoronanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
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Appendix F Laboratory Data  
Surface Soil  
Site Inspection Report, Fort William Henry Harrison

Area of Interest Sample ID Sample Date Depth		AOI02																											
		AOI02-03-SB-00-02-DUP				AOI2-SS1-0-2				AOI2-SS2-0-2				AOI2-SS2-0-2-DUP				AOI2-SS3-0-2				AOI2-SS4-0-2				AOI2-SS5-0-2			
		10/06/2020				05/20/2019				05/20/2019				05/20/2019				05/20/2019				05/20/2019				05/20/2019			
Analyte	OSD Screening Level <sup>a</sup>	0 - 2 ft				0 - 2 ft				0 - 2 ft				0 - 2 ft				0 - 2 ft				0 - 2 ft				0 - 2 ft			
		Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
Soil, PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (ug/Kg)																													
6:2 FTS	-	<	0.412	1.03	U	<	0.471	1.18	U	0.023	0.462	1.15	J	<	0.455	1.14	U	<	0.430	1.07	U	<	0.456	1.14	U	<	0.423	1.06	U
8:2 FTS	-	<	0.412	1.03	U	0.033	0.471	1.18	J	<	0.462	1.15	U	<	0.455	1.14	U	<	0.430	1.07	U	<	0.456	1.14	U	<	0.423	1.06	U
NEtFOSAA	-	<	0.412	1.03	U	<	0.471	1.18	U	<	0.462	1.15	U	<	0.455	1.14	U	<	0.430	1.07	U	<	0.456	1.14	U	0.00995	0.423	1.06	J
NMeFOSAA	-	<	0.412	1.03	U	<	0.471	1.18	U	0.029	0.462	1.15	J	<	0.455	1.14	U	<	0.430	1.07	U	<	0.456	1.14	U	<	0.423	1.06	U
PFBA	-	<	0.412	1.03	U	0.215	0.471	1.18	J	<	0.462	1.15	U	<	0.455	1.14	U	0.071	0.430	1.07	J	<	0.456	1.14	U	<	0.423	1.06	U
PFBS	130000	<	0.412	1.03	U	0.03	0.471	1.18	J	<	0.462	1.15	U	<	0.455	1.14	U	0.00705	0.430	1.07	J	<	0.456	1.14	U	<	0.423	1.06	U
PFDA	-	<	0.412	1.03	U	<	0.471	1.18	U	<	0.462	1.15	U	0.024	0.455	1.14	J	0.012	0.430	1.07	J	0.03	0.456	1.14	J	<	0.423	1.06	U
PFDaA	-	<	0.412	1.03	U	0.00614	0.471	1.18	J	<	0.462	1.15	U	<	0.455	1.14	U	<	0.430	1.07	U	<	0.456	1.14	U	<	0.423	1.06	U
PFHpA	-	<	0.412	1.03	U	0.085	0.471	1.18	J	0.012	0.462	1.15	J	0.00955	0.455	1.14	J	0.013	0.430	1.07	J	<	0.456	1.14	U	0.021	0.423	1.06	J
PFHxA	-	<	0.412	1.03	U	<	0.471	1.18	U	<	0.462	1.15	U	<	0.455	1.14	U	<	0.430	1.07	U	<	0.456	1.14	U	<	0.423	1.06	U
PFHxS	-	<	0.412	1.03	U	0.193	0.471	1.18	J	0.025	0.462	1.15	J	0.038	0.455	1.14	J	0.032	0.430	1.07	J	0.069	0.456	1.14	J	0.062	0.423	1.06	J
PFNA	-	<	0.412	1.03	U	0.074	0.471	1.18	J	0.03	0.462	1.15	J	0.025	0.455	1.14	J	<	0.430	1.07	U	0.048	0.456	1.14	J	0.048	0.423	1.06	J
PFOA	130	<	0.412	1.03	U	0.132	0.471	1.18	J	<	0.462	1.15	U	0.055	0.455	1.14	J	<	0.430	1.07	U	0.098	0.456	1.14	J	0.08	0.423	1.06	J
PFOS	130	0.807	0.412	1.03	J	2.22	0.471	1.18		0.893	0.462	1.15	J	0.758	0.455	1.14	J	0.181	0.430	1.07	J	1.09	0.456	1.14	J+	0.679	0.423	1.06	J
PFPeA	-	<	0.412	1.03	U	0.421	0.471	1.18	J	<	0.462	1.15	U	<	0.455	1.14	U	0.14	0.430	1.07	J	<	0.456	1.14	U	<	0.423	1.06	U
PFTeDA	-	<	0.412	1.03	U	<	0.471	1.18	U	<	0.462	1.15	U	<	0.455	1.14	U	<	0.430	1.07	U	<	0.456	1.14	U	<	0.423	1.06	U
PFTTrDA	-	<	0.412	1.03	U	<	0.471	1.18	U	<	0.462	1.15	U	<	0.455	1.14	U	<	0.430	1.07	U	<	0.456	1.14	U	<	0.423	1.06	U
PFUnDA	-	<	0.412	1.03	U	<	0.471	1.18	U	0.00894	0.462	1.15	J	<	0.455	1.14	U	<	0.430	1.07	U	<	0.456	1.14	U	<	0.423	1.06	U

Grey Fill Detected concentration exceeded OSD Screening Levels

References

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PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid
PFTeDA	perfluorotetradecanoic acid
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ug/Kg	micrograms per Kilogram
-	Not applicable
<	analyte not detected above the LOD

Appendix F Laboratory Data  
Surface Soil  
Site Inspection Report, Fort William Henry Harrison

Area of Interest Sample ID Sample Date Depth		AOI02												AOI03															
		AOI02-SS6-00-02				AOI02-SS7-00-02				AOI02-SS8-00-02				AOI3-HA1-0-2				AOI3-SB1-0-2				AOI03-02-SB-00-02				AOI03-SS1-00-02			
		10/06/2020				10/06/2020				10/06/2020				02/12/2019				05/22/2019				10/06/2020				10/07/2020			
		0 - 2 ft				0 - 2 ft				0 - 2 ft				0 - 2 ft				0 - 2 ft				0 - 2 ft				0 - 2 ft			
Analyte	OSD Screening Level <sup>a</sup>	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
Soil, PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (ug/Kg)																													
6:2 FTS	-	<	0.434	1.08	U	<	0.435	1.09	U	<	0.425	1.06	U	0.021	0.427	1.07	J	<	0.552	1.38	U	<	0.433	1.08	U	<	0.441	1.10	U
8:2 FTS	-	<	0.434	1.08	U	<	0.435	1.09	U	<	0.425	1.06	U	<	0.427	1.07	U	0.103	0.552	1.38	J	<	0.433	1.08	U	<	0.441	1.10	U
NEtFOSAA	-	<	0.434	1.08	U	<	0.435	1.09	U	<	0.425	1.06	U	<	0.427	1.07	U	<	0.552	1.38	U	<	0.433	1.08	U	<	0.441	1.10	U
NMeFOSAA	-	<	0.434	1.08	U	<	0.435	1.09	U	<	0.425	1.06	U	<	0.427	1.07	U	<	0.552	1.38	U	<	0.433	1.08	U	<	0.441	1.10	U
PFBA	-	<	0.434	1.08	U	<	0.435	1.09	U	<	0.425	1.06	U	<	0.427	1.07	U	0.181	0.552	1.38	J	<	0.433	1.08	U	<	0.441	1.10	U
PFBS	130000	<	0.434	1.08	U	<	0.435	1.09	U	<	0.425	1.06	U	0.178	0.427	1.07	J	0.103	0.552	1.38	J	<	0.433	1.08	U	<	0.441	1.10	U
PFDA	-	<	0.434	1.08	U	<	0.435	1.09	U	<	0.425	1.06	U	<	0.427	1.07	U	0.024	0.552	1.38	J	<	0.433	1.08	U	<	0.441	1.10	U
PFDaA	-	<	0.434	1.08	U	<	0.435	1.09	U	<	0.425	1.06	U	<	0.427	1.07	U	<	0.552	1.38	U	<	0.433	1.08	U	<	0.441	1.10	U
PFHpA	-	<	0.434	1.08	U	<	0.435	1.09	U	<	0.425	1.06	U	0.04	0.427	1.07	J	0.698	0.552	1.38	J	<	0.433	1.08	U	<	0.441	1.10	U
PFHxA	-	0.165	0.434	1.08	J	0.282	0.435	1.09	J	<	0.425	1.06	U	1.05	0.427	1.07	J	0.792	0.552	1.38	J	<	0.433	1.08	U	<	0.441	1.10	U
PFHxS	-	0.213	0.434	1.08	J	0.259	0.435	1.09	J	0.274	0.425	1.06	J	0.345	0.427	1.07	J	5.02	0.552	1.38	<	0.433	1.08	U	<	0.441	1.10	U	
PFNA	-	<	0.434	1.08	U	<	0.435	1.09	U	<	0.425	1.06	U	<	0.427	1.07	U	0.110	0.552	1.38	J	<	0.433	1.08	U	<	0.441	1.10	U
PFOA	130	<	0.434	1.08	U	<	0.435	1.09	U	<	0.425	1.06	U	0.043	0.427	1.07	J	0.473	0.552	1.38	J	<	0.433	1.08	U	<	0.441	1.10	U
PFOS	130	0.678	0.434	1.08	J	<	0.435	1.09	U	0.617	0.425	1.06	J	0.308	0.427	1.07	J	12.3	0.552	1.38	<	0.433	1.08	U	<	0.441	1.10	U	
PFPeA	-	<	0.434	1.08	U	<	0.435	1.09	U	<	0.425	1.06	U	1.3	0.427	1.07	J	0.248	0.552	1.38	J	<	0.433	1.08	U	<	0.441	1.10	U
PFTeDA	-	<	0.434	1.08	U	<	0.435	1.09	U	<	0.425	1.06	U	0.012	0.427	1.07	J	<	0.552	1.38	U	<	0.433	1.08	U	<	0.441	1.10	U
PFTrDA	-	<	0.434	1.08	U	<	0.435	1.09	U	<	0.425	1.06	U	<	0.427	1.07	U	<	0.552	1.38	U	<	0.433	1.08	U	<	0.441	1.10	U
PFUnDA	-	<	0.434	1.08	U	<	0.435	1.09	U	<	0.425	1.06	U	<	0.427	1.07	U	<	0.552	1.38	U	<	0.433	1.08	U	<	0.441	1.10	U

Grey Fill Detected concentration exceeded OSD Screening Levels

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a. Assistant Secretary of Defense, 2019. Risk Based Screening Levels Calculated for PFOS, PFOA, PFBS in Groundwater or Soil using USEPA's Regional Screening Level Calculator. HQ-0.1. 15 October 2019. Soil screening levels based on residential scenario for direct ingestion of contaminated soil.

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U = The analyte was not detected at a level greater than or equal to the adjusted detection limit (DL)

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UXX = The presence or absence of the analyte cannot be substantiated. Acceptance or rejection of the data should be decided by the project team, but exclusion of the data is recommended.

Chemical Abbreviations

6:2 FTS	6:2 fluorotelomer sulfonate
8:2 FTS	8:2 fluorotelomer sulfonate
NEtFOSAA	N-ethyl perfluorooctane- sulfonamidoacetic acid
NMeFOSAA	N-methyl perfluorooctanesulfonamidoacetic acid
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFDaA	perfluorododecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid
PFTeDA	perfluorotetradecanoic acid
PFTrDA	perfluorotridecanoic acid
PFUnDA	perfluoro-n-undecanoic acid

Acronyms and Abbreviations

AOI	Area of Interest
DUP	Duplicate
ft	feet
HA	Hand auger
HQ	Hazard quotient
LCMSMS	Liquid Chromatography Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
OSD	Office of the Secretary of Defense
QSM	Quality Systems Manual
Qual	Interpreted Qualifier
RE	Re-extracted
SB	Soil boring
SS	Surface Soil
USEPA	United States Environmental Protection Agency
ug/Kg	micrograms per Kilogram
-	Not applicable
<	analyte not detected above the LOD



**Appendix F Laboratory Data**  
**Surface Soil**  
**Site Inspection Report, Fort William Henry Harrison**

Area of Interest Sample ID Sample Date Depth		AOI03																			
		AOI03-SS2-00-02				AOI03-SS3-00-02				AOI03-SS4-00-02				AOI03-SS4-00-02-DUP				AOI03-SS5-00-02			
		10/07/2020				10/07/2020				10/07/2020				10/07/2020				10/07/2020			
		0 - 2 ft				0 - 2 ft				0 - 2 ft				0 - 2 ft				0 - 2 ft			
Analyte	OSD Screening Level <sup>a</sup>	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
Soil, PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (ug/Kg)																					
6:2 FTS	-	<	0.392	0.980	U	<	0.420	1.05	U	<	0.436	1.09	U	<	0.454	1.13	U	<	0.460	1.15	U
8:2 FTS	-	<	0.392	0.980	U	<	0.420	1.05	U	<	0.436	1.09	U	<	0.454	1.13	U	<	0.460	1.15	U
NEtFOSAA	-	<	0.392	0.980	U	<	0.420	1.05	U	<	0.436	1.09	U	<	0.454	1.13	U	<	0.460	1.15	U
NMeFOSAA	-	<	0.392	0.980	U	<	0.420	1.05	U	<	0.436	1.09	U	<	0.454	1.13	U	<	0.460	1.15	U
PFBA	-	<	0.392	0.980	U	<	0.420	1.05	U	<	0.436	1.09	U	<	0.454	1.13	U	<	0.460	1.15	U
PFBS	130000	<	0.392	0.980	U	<	0.420	1.05	U	<	0.436	1.09	U	<	0.454	1.13	U	<	0.460	1.15	U
PFDA	-	<	0.392	0.980	U	<	0.420	1.05	U	<	0.436	1.09	U	<	0.454	1.13	U	<	0.460	1.15	U
PFDaA	-	<	0.392	0.980	U	<	0.420	1.05	U	<	0.436	1.09	U	<	0.454	1.13	U	<	0.460	1.15	U
PFHpA	-	<	0.392	0.980	U	<	0.420	1.05	U	<	0.436	1.09	U	<	0.454	1.13	U	<	0.460	1.15	U
PFHxA	-	<	0.392	0.980	U	<	0.420	1.05	U	<	0.436	1.09	U	<	0.454	1.13	U	<	0.460	1.15	U
PFHxS	-	<	0.392	0.980	U	0.278	0.420	1.05	J	<	0.436	1.09	U	<	0.454	1.13	U	<	0.460	1.15	U
PFNA	-	<	0.392	0.980	U	<	0.420	1.05	U	<	0.436	1.09	U	<	0.454	1.13	U	<	0.460	1.15	U
PFOA	130	<	0.392	0.980	U	<	0.420	1.05	U	<	0.436	1.09	U	<	0.454	1.13	U	<	0.460	1.15	U
PFOS	130	0.438	0.392	0.980	J	2.91	0.420	1.05		0.764	0.436	1.09	J	0.936	0.454	1.13	J	0.215	0.460	1.15	J
PFPeA	-	<	0.392	0.980	U	<	0.420	1.05	U	<	0.436	1.09	U	<	0.454	1.13	U	<	0.460	1.15	U
PFTeDA	-	<	0.392	0.980	U	<	0.420	1.05	U	<	0.436	1.09	U	<	0.454	1.13	U	<	0.460	1.15	U
PFTTrDA	-	<	0.392	0.980	U	<	0.420	1.05	U	<	0.436	1.09	U	<	0.454	1.13	U	<	0.460	1.15	U
PFUnDA	-	<	0.392	0.980	U	<	0.420	1.05	U	<	0.436	1.09	U	<	0.454	1.13	U	<	0.460	1.15	U

**Grey Fill** Detected concentration exceeded OSD Screening Levels

**References**  
a. Assistant Secretary of Defense, 2019. Risk Based Screening Levels Calculated for PFOS, PFOA, PFBS in Groundwater or Soil using USEPA's Regional Screening Level Calculator. HQ-0.1. 15 October 2019. Soil screening levels based on residential scenario for direct ingestion of contaminated soil.

**Interpreted Qualifiers**  
J = Estimated concentration, biased high  
U = The analyte was not detected at a level greater than or equal to the adjusted detection limit (DL)  
UJ = The analyte was not detected at a level greater than or equal to the adjusted DL. However, the reported adjusted DL is approximate and may be inaccurate or imprecise.  
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PFTeDA	perfluorotetradecanoic acid
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PFUnDA	perfluoro-n-undecanoic acid

Acronyms and Abbreviations	
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HA	Hand auger
HQ	Hazard quotient
LCMSMS	Liquid Chromatography Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
OSD	Office of the Secretary of Defense
QSM	Quality Systems Manual
Qual	Interpreted Qualifier
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SS	Surface Soil
USEPA	United States Environmental Protection Agency
ug/Kg	micrograms per Kilogram
-	Not applicable
<	analyte not detected above the LOD

**Appendix F Laboratory Data  
Groundwater  
Site Inspection Report, Fort William Henry Harrison**

Area of Interest Sample ID Sample Date		AOI01																											
		AOI1-MW1				AOI1-MW1-GW				AOI1-MW2				AOI1-MW2-DUP				AOI1-MW2-GW				AOI1-MW3				AOI1-MW3-GW			
		05/28/2019				10/11/2020				05/29/2019				05/29/2019				10/12/2020				05/25/2019				10/10/2020			
Analyte	OSD Screening Level *	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
Water, PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (ng/L)																													
6:2 FTS	-	<	2.00	5.00	U	<	4.00	10.0	U	<	3.57	8.93	U	<	3.57	8.93	U	<	4.00	10.0	U	3.24	3.33	8.33	J	<	4.00	10.0	U
8:2 FTS	-	<	2.00	5.00	U	<	4.00	10.0	U	<	3.57	8.93	U	<	3.57	8.93	U	<	4.00	10.0	U	<	3.33	8.33	U	<	4.00	10.0	U
NEtFOSAA	-	<	4.00	5.00	U	<	8.00	10.0	U	<	7.14	8.93	U	<	7.14	8.93	U	<	8.00	10.0	U	<	6.67	8.33	U	<	8.00	10.0	U
NMeFOSAA	-	<	4.00	5.00	U	<	8.00	10.0	U	<	7.14	8.93	U	<	7.14	8.93	U	<	8.00	10.0	U	<	6.67	8.33	U	<	8.00	10.0	U
PFBA	-	4.52	2.00	5.00	J	<	4.00	10.0	U	8.34	3.57	8.93	J	9.18	3.57	8.93		17.2	4.00	10.0		30.2	3.33	8.33		25.9	4.00	10.0	
PFBS	40000	3.16	2.00	5.00	J	3.00	4.00	10.0	J	4.52	3.57	8.93	J	4.74	3.57	8.93	J	11.2	4.00	10.0		34.1	3.33	8.33		23.1	4.00	10.0	
PFDA	-	<	2.00	5.00	UJ	<	4.00	10.0	U	<	3.57	8.93	U	<	3.57	8.93	U	<	4.00	10.0	U	<	3.33	8.33	UJ	<	4.00	10.0	U
PFDoA	-	<	2.00	5.00	U	<	4.00	10.0	U	<	3.57	8.93	U	<	3.57	8.93	U	<	4.00	10.0	U	<	3.33	8.33	U	<	4.00	10.0	U
PFHpA	-	1.83	2.00	5.00	J	<	4.00	10.0	U	4.00	3.57	8.93	J	3.84	3.57	8.93	J	4.90	4.00	10.0	J	22.4	3.33	8.33		23.0	4.00	10.0	
PFHxA	-	7.81	2.00	5.00		4.32	4.00	10.0	J	15.2	3.57	8.93		15.2	3.57	8.93		33.4	4.00	10.0		80.9	3.33	8.33		72.6	4.00	10.0	
PFHxS	-	22.3	2.00	5.00		21.0	4.00	10.0		33.9	3.57	8.93		34.3	3.57	8.93		18.0	4.00	10.0		213	3.33	8.33		184	4.00	10.0	J+
PFNA	-	<	2.00	5.00	U	<	4.00	10.0	U	<	3.57	8.93	U	<	3.57	8.93	U	<	4.00	10.0	U	<	3.33	8.33	U	<	4.00	10.0	U
PFOA	40	1.17	2.00	5.00	J	2.10	4.00	10.0	J	4.58	3.57	8.93	J	4.43	3.57	8.93	J	2.75	4.00	10.0	J	12.4	3.33	8.33	J+	13.5	4.00	10.0	
PFOS	40	8.82	2.00	5.00		5.53	4.00	10.0	J	29.2	3.57	8.93		27.3	3.57	8.93		25.4	4.00	10.0		24.8	3.33	8.33		62.2	4.00	10.0	
PFPeA	-	9.46	2.00	5.00		4.68	4.00	10.0	J	16.7	3.57	8.93		16.7	3.57	8.93		47.3	4.00	10.0		103	3.33	8.33		78.6	4.00	10.0	
PFTeDA	-	<	2.00	5.00	U	<	4.00	10.0	U	<	3.57	8.93	U	<	3.57	8.93	U	<	4.00	10.0	U	<	3.33	8.33	U	<	4.00	10.0	U
PFTrDA	-	<	2.00	5.00	U	<	4.00	10.0	U	<	3.57	8.93	U	<	3.57	8.93	U	<	4.00	10.0	U	<	3.33	8.33	U	<	4.00	10.0	U
PFUnDA	-	<	2.00	5.00	U	<	4.00	10.0	U	<	3.57	8.93	U	<	3.57	8.93	U	<	4.00	10.0	U	<	3.33	8.33	U	<	4.00	10.0	U

**Grey F#** Detected concentration exceeded OSD Screening Levels

**References**

a. Assistant Secretary of Defense, 2019. Risk Based Screening Levels Calculated for PFOS, PFOA, PFBS in Groundwater or Soil using USEPA's Regional Screening Level Calculator. HQ=0.1. 15 October 2019. Groundwater screening levels based on residential scenario for direct ingestion of groundwater.

**Interpreted Qualifiers**

J = Estimated concentration

J- = Estimated concentration, biased low

J+ = Estimated concentration, biased high

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**Chemical Abbreviations**

6:2 FTS	6:2 fluorotelomer sulfonate
8:2 FTS	8:2 fluorotelomer sulfonate
NEtFOSAA	N-ethyl perfluorooctane- sulfonamidoacetic acid
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PFPeA	perfluoropentanoic acid
PFTeDA	perfluorotetradecanoic acid
PFTrDA	perfluorotridecanoic acid
PFUnDA	perfluoro-n-undecanoic acid

**Acronyms and Abbreviations**

AOI	Area of Interest
DUP	Duplicate
GW	Groundwater
HQ	Hazard quotient
LCMSMS	Liquid Chromatography Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
OSD	Office of the Secretary of Defense
QSM	Quality Systems Manual
Qual	Interpreted Qualifier
USEPA	United States Environmental Protection Agency
ng/L	nanogram per liter
-	Not applicable
<	analyte not detected above the LOD

**Appendix F Laboratory Data  
Groundwater  
Site Inspection Report, Fort William Henry Harrison**

Area of Interest Sample ID Sample Date		AOI01																											
		AOI1-MW3-GW-DUP				AOI01-MW04-GW				AOI01-MW05-GW				AOI01-MW06-GW				BH-02				BH-02-101020				FH-02			
		10/10/2020				10/14/2020				10/12/2020				10/13/2020				05/28/2019				10/10/2020				05/28/2019			
Analyte	OSD Screening Level *	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
Water, PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (ng/L)																													
6:2 FTS	-	<	4.00	10.0	U	<	4.00	10.0	U	<	4.00	10.0	U	<	4.00	10.0	U	<	2.00	5.00	U	<	4.00	10.0	U	<	2.00	5.00	U
8:2 FTS	-	<	4.00	10.0	U	<	4.00	10.0	U	<	4.00	10.0	U	<	4.00	10.0	U	<	2.00	5.00	U	<	4.00	10.0	U	<	2.00	5.00	U
NEtFOSAA	-	<	8.00	10.0	U	<	8.00	10.0	U	<	8.00	10.0	U	<	8.00	10.0	U	<	4.00	5.00	U	<	8.00	10.0	U	<	4.00	5.00	U
NMeFOSAA	-	<	8.00	10.0	U	<	8.00	10.0	U	<	8.00	10.0	U	<	8.00	10.0	U	<	4.00	5.00	U	<	8.00	10.0	U	<	4.00	5.00	U
PFBA	-	27.1	4.00	10.0		2.90	4.00	10.0	J	18.4	4.00	10.0		11.6	4.00	10.0		6.30	2.00	5.00		4.02	4.00	10.0	J	7.59	2.00	5.00	
PFBS	40000	25.8	4.00	10.0		3.24	4.00	10.0	J	21.7	4.00	10.0		14.7	4.00	10.0		1.66	2.00	5.00	J	<	4.00	10.0	U	2.65	2.00	5.00	J
PFDA	-	<	4.00	10.0	U	<	4.00	10.0	U	<	4.00	10.0	U	<	4.00	10.0	U	1.74	2.00	5.00	J	<	4.00	10.0	U	<	2.00	5.00	U
PFDoA	-	<	4.00	10.0	U	<	4.00	10.0	U	<	4.00	10.0	U	<	4.00	10.0	U	<	2.00	5.00	U	<	4.00	10.0	U	<	2.00	5.00	U
PFHpA	-	23.8	4.00	10.0		<	4.00	10.0	U	11.5	4.00	10.0		15.7	4.00	10.0		2.69	2.00	5.00	J	<	4.00	10.0	U	3.97	2.00	5.00	J
PFHxA	-	84.2	4.00	10.0		5.05	4.00	10.0	J	53.3	4.00	10.0		25.2	4.00	10.0		10.2	2.00	5.00		7.25	4.00	10.0	J	13.8	2.00	5.00	
PFHxS	-	197	4.00	10.0	J+	12.2	4.00	10.0		77.0	4.00	10.0		114	4.00	10.0		5.06	2.00	5.00		4.89	4.00	10.0	J	16.7	2.00	5.00	
PFNA	-	<	4.00	10.0	U	<	4.00	10.0	U	<	4.00	10.0	U	1.71	4.00	10.0	J	0.861	2.00	5.00	J	<	4.00	10.0	U	<	2.00	5.00	U
PFOA	40	14.3	4.00	10.0		2.34	4.00	10.0	J	8.19	4.00	10.0	J	9.16	4.00	10.0	J	4.68	2.00	5.00	J+	<	4.00	10.0	U	7.31	2.00	5.00	J+
PFOS	40	61.6	4.00	10.0		5.26	4.00	10.0	J	34.4	4.00	10.0		34.2	4.00	10.0		6.88	2.00	5.00		2.61	4.00	10.0	J	9.25	2.00	5.00	
PFPeA	-	88.6	4.00	10.0		6.51	4.00	10.0	J	56.5	4.00	10.0		21.6	4.00	10.0		10.2	2.00	5.00		7.30	4.00	10.0	J	16.5	2.00	5.00	
PFTeDA	-	<	4.00	10.0	U	<	4.00	10.0	U	<	4.00	10.0	U	<	4.00	10.0	U	<	2.00	5.00	U	<	4.00	10.0	U	<	2.00	5.00	U
PFTrDA	-	<	4.00	10.0	U	<	4.00	10.0	U	<	4.00	10.0	U	<	4.00	10.0	U	<	2.00	5.00	U	<	4.00	10.0	U	<	2.00	5.00	U
PFUnDA	-	<	4.00	10.0	U	<	4.00	10.0	U	<	4.00	10.0	U	<	4.00	10.0	U	<	2.00	5.00	U	<	4.00	10.0	U	<	2.00	5.00	U

**Grey F#** Detected concentration exceeded OSD Screening Levels

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USEPA	United States Environmental Protection Agency
ng/L	nanogram per liter
-	Not applicable
<	analyte not detected above the LOD

**Appendix F Laboratory Data  
Groundwater  
Site Inspection Report, Fort William Henry Harrison**

Area of Interest Sample ID Sample Date		AOI01								AOI02																			
		FH-02-101120				FH-02-101120 (RE)				AOI2-MW1				AOI2-MW1-GW				AOI2-MW2				AOI2-MW2-GW							
		10/11/2020				10/11/2020				05/29/2019				10/12/2020				10/12/2020				05/30/2019				10/13/2020			
Analyte	OSD Screening Level *	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
Water, PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (ng/L)																													
6:2 FTS	-	<	4.00	10.0	U	-	-	-	<	3.33	8.33	U	<	4.81	10.0	U	<	6.38	10.0	U	<	3.57	8.93	U	<	4.00	10.0	U	
8:2 FTS	-	<	4.00	10.0	U	-	-	-	<	3.33	8.33	U	<	4.00	10.0	U	<	4.00	10.0	U	<	3.57	8.93	U	<	4.00	10.0	U	
NEtFOSAA	-	<	8.00	10.0	U	-	-	-	<	6.67	8.33	U	<	8.00	10.0	U	<	8.00	10.0	U	<	7.14	8.93	U	<	8.00	10.0	U	
NMeFOSAA	-	<	8.00	10.0	U	-	-	-	<	6.67	8.33	U	<	8.00	10.0	U	<	8.00	10.0	U	<	7.14	8.93	U	<	8.00	10.0	U	
PFBA	-	-	-	-	-	6.42	4.00	10.0	J	36.2	3.33	8.33		41.6	4.00	10.0		43.2	4.00	10.0		3.74	3.57	8.93	J	<	4.00	10.0	U
PFBS	40000	2.06	4.00	10.0	J	-	-	-	27.3	3.33	8.33		16.5	4.00	10.0		17.5	4.00	10.0		1.36	3.57	8.93	J	<	4.00	10.0	U	
PFDA	-	<	4.00	10.0	U	-	-	-	<	3.33	8.33	U	<	4.00	10.0	U	<	4.00	10.0	U	<	3.57	8.93	U	<	4.00	10.0	U	
PFDoA	-	<	4.00	10.0	U	-	-	-	<	3.33	8.33	U	<	4.00	10.0	U	<	4.00	10.0	U	<	3.57	8.93	U	<	4.00	10.0	U	
PFHpA	-	3.90	4.00	10.0	J	-	-	-	19.0	3.33	8.33		21.8	4.00	10.0		23.0	4.00	10.0		<	3.57	8.93	U	<	4.00	10.0	U	
PFHxA	-	11.6	4.00	10.0		-	-	-	102	3.33	8.33	J-	108	4.00	10.0		109	4.00	10.0		3.03	3.57	8.93	J	<	4.00	10.0	U	
PFHxS	-	20.4	4.00	10.0		-	-	-	155	3.33	8.33	J-	154	4.00	10.0		153	4.00	10.0		27.6	3.57	8.93		1.86	4.00	10.0	J	
PFNA	-	<	4.00	10.0	U	-	-	-	1.86	3.33	8.33	J	<	4.00	10.0	U	<	4.00	10.0	U	<	3.57	8.93	U	<	4.00	10.0	U	
PFOA	40	7.25	4.00	10.0	J	-	-	-	10.7	3.33	8.33	J+	12.6	4.00	10.0		14.6	4.00	10.0		3.07	3.57	8.93	J+	<	4.00	10.0	U	
PFOS	40	8.74	4.00	10.0	J	-	-	-	118	3.33	8.33		89.4	4.00	10.0		110	4.00	10.0		9.14	3.57	8.93		4.67	4.00	10.0	J	
PFPeA	-	13.1	4.00	10.0		-	-	-	121	3.33	8.33		151	4.00	10.0		153	4.00	10.0		<	3.57	8.93	U	<	4.00	10.0	U	
PFTeDA	-	<	4.00	10.0	U	-	-	-	<	3.33	8.33	U	<	4.00	10.0	U	<	4.00	10.0	U	<	3.57	8.93	U	<	4.00	10.0	U	
PFTrDA	-	<	4.00	10.0	U	-	-	-	<	3.33	8.33	U	<	4.00	10.0	U	<	4.00	10.0	U	<	3.57	8.93	U	<	4.00	10.0	U	
PFUnDA	-	<	4.00	10.0	U	-	-	-	<	3.33	8.33	U	<	4.00	10.0	U	<	4.00	10.0	U	<	3.57	8.93	U	<	4.00	10.0	U	

**Grey F#** Detected concentration exceeded OSD Screening Levels

**References**

a. Assistant Secretary of Defense, 2019. Risk Based Screening Levels Calculated for PFOS, PFOA, PFBS in Groundwater or Soil using USEPA's Regional Screening Level Calculator. HQ=0.1. 15 October 2019. Groundwater screening levels based on residential scenario for direct ingestion of groundwater.

**Interpreted Qualifiers**

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J- = Estimated concentration, biased low

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**Chemical Abbreviations**

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NEtFOSAA	N-ethyl perfluorooctane- sulfonamidoacetic acid
NMeFOSAA	N-methyl perfluorooctanesulfonamidoacetic acid
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFDoA	perfluorododecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid
PFTeDA	perfluorotetradecanoic acid
PFTrDA	perfluorotridecanoic acid
PFUnDA	perfluoro-n-undecanoic acid

**Acronyms and Abbreviations**

AOI	Area of Interest
DUP	Duplicate
GW	Groundwater
HQ	Hazard quotient
LCMSMS	Liquid Chromatography Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
OSD	Office of the Secretary of Defense
QSM	Quality Systems Manual
Qual	Interpreted Qualifier
USEPA	United States Environmental Protection Agency
ng/L	nanogram per liter
-	Not applicable
<	analyte not detected above the LOD



**Appendix F Laboratory Data  
Groundwater  
Site Inspection Report, Fort William Henry Harrison**

Area of Interest Sample ID Sample Date		AOI02																								AOI03			
		AOI02-MW03-GW				MW-06				MW-06-DUP				MW-07				MW-08				MW-11-100920				AOI3-MW1			
		10/14/2020				05/29/2019				05/29/2019				05/30/2019				05/29/2019				10/09/2020				05/29/2019			
Analyte	OSD Screening Level <sup>a</sup>	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
<b>Water, PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (ng/L)</b>																													
6:2 FTS	-	<	4.56	10.0	U	<	3.57	8.93	U	<	3.33	8.33	U	<	3.57	8.93	U	<	3.33	8.33	U	<	4.00	10.0	U	<	3.33	8.33	U
8:2 FTS	-	<	4.00	10.0	U	<	3.57	8.93	U	<	3.33	8.33	U	<	3.57	8.93	U	<	3.33	8.33	U	<	4.00	10.0	U	<	3.33	8.33	U
NEtFOSAA	-	<	8.00	10.0	U	<	7.14	8.93	U	<	6.67	8.33	U	<	7.14	8.93	U	<	6.67	8.33	U	<	8.00	10.0	U	<	6.67	8.33	U
NMeFOSAA	-	<	8.00	10.0	U	<	7.14	8.93	U	<	6.67	8.33	U	<	7.14	8.93	U	<	6.67	8.33	U	<	8.00	10.0	U	<	6.67	8.33	U
PFBA	-	39.2	4.00	10.0		10.4	3.57	8.93		<	3.33	8.33	U	<	3.57	8.93	U	45.3	3.33	8.33		2.23	4.00	10.0	J	14.8	3.33	8.33	
PFBS	40000	17.2	4.00	10.0		<	3.57	8.93	U	<	3.33	8.33	U	<	3.57	8.93	U	20.9	3.33	8.33		<	4.00	10.0	U	59.2	3.33	8.33	
PFDA	-	<	4.00	10.0	U	<	3.57	8.93	U	<	3.33	8.33	U	<	3.57	8.93	U	<	3.33	8.33	U	<	4.00	10.0	U	<	3.33	8.33	U
PFDoA	-	<	4.00	10.0	U	<	3.57	8.93	U	<	3.33	8.33	U	<	3.57	8.93	U	<	3.33	8.33	U	<	4.00	10.0	U	<	3.33	8.33	U
PFHpA	-	24.6	4.00	10.0		<	3.57	8.93	U	<	3.33	8.33	U	<	3.57	8.93	U	20.6	3.33	8.33		<	4.00	10.0	U	1.60	3.33	8.33	J
PFHxA	-	87.2	4.00	10.0		<	3.57	8.93	U	1.82	3.33	8.33	J	1.74	3.57	8.93	J	112	3.33	8.33		2.71	4.00	10.0	J	48.7	3.33	8.33	
PFHxS	-	113	4.00	10.0		1.99	3.57	8.93	J	<	3.33	8.33	U	2.17	3.57	8.93	J	69.9	3.33	8.33		<	4.00	10.0	U	5.66	3.33	8.33	J
PFNA	-	<	4.00	10.0	U	<	3.57	8.93	U	<	3.33	8.33	U	<	3.57	8.93	U	<	3.33	8.33	U	<	4.00	10.0	U	<	3.33	8.33	U
PFOA	40	10.0	4.00	10.0		<	3.57	8.93	U	<	3.33	8.33	U	<	3.57	8.93	U	10.8	3.33	8.33	J+	<	4.00	10.0	U	<	3.33	8.33	U
PFOS	40	6.29	4.00	10.0	J	1.83	3.57	8.93	J	<	3.33	8.33	U	<	3.57	8.93	U	8.74	3.33	8.33		<	4.00	10.0	U	1.63	3.33	8.33	J
PFPeA	-	152	4.00	10.0		<	3.57	8.93	U	<	3.33	8.33	U	<	3.57	8.93	U	171	3.33	8.33		<	4.00	10.0	U	15.4	3.33	8.33	
PFTeDA	-	<	4.00	10.0	U	<	3.57	8.93	U	<	3.33	8.33	U	<	3.57	8.93	U	<	3.33	8.33	U	<	4.00	10.0	U	<	3.33	8.33	U
PFTrDA	-	<	4.00	10.0	U	<	3.57	8.93	U	<	3.33	8.33	U	<	3.57	8.93	U	<	3.33	8.33	U	<	4.00	10.0	U	<	3.33	8.33	U
PFUnDA	-	<	4.00	10.0	U	<	3.57	8.93	U	<	3.33	8.33	U	<	3.57	8.93	U	<	3.33	8.33	U	<	4.00	10.0	U	<	3.33	8.33	U

**Grey F#** Detected concentration exceeded OSD Screening Levels

**References**

a. Assistant Secretary of Defense, 2019. Risk Based Screening Levels Calculated for PFOS, PFOA, PFBS in Groundwater or Soil using USEPA's Regional Screening Level Calculator. HQ=0.1. 15 October 2019. Groundwater screening levels based on residential scenario for direct ingestion of groundwater.

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PFDA	perfluorodecanoic acid
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PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
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PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid
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PFTrDA	perfluorotridecanoic acid
PFUnDA	perfluoro-n-undecanoic acid

**Acronyms and Abbreviations**

AOI	Area of Interest
DUP	Duplicate
GW	Groundwater
HQ	Hazard quotient
LCMSMS	Liquid Chromatography Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
OSD	Office of the Secretary of Defense
QSM	Quality Systems Manual
Qual	Interpreted Qualifier
USEPA	United States Environmental Protection Agency
ng/L	nanogram per liter
-	Not applicable
<	analyte not detected above the LOD

**Appendix F Laboratory Data  
Groundwater  
Site Inspection Report, Fort William Henry Harrison**

Area of Interest Sample ID Sample Date		AOI03																											
		AOI3-MW1-GW				AOI03-MW02-GW				MW-08-101120				MW-10				MW-11				OBTMW-01				PH-1			
		10/09/2020				10/13/2020				10/11/2020				05/29/2019				05/30/2019				05/30/2019				05/30/2019			
Analyte	OSD Screening Level *	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
Water, PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (ng/L)																													
6:2 FTS	-	<	4.00	10.0	U	<	4.00	10.0	U	<	4.00	10.0	U	<	2.00	5.00	U	<	2.00	5.00	U	<	2.00	5.00	U	<	3.33	8.33	U
8:2 FTS	-	<	4.00	10.0	U	<	4.00	10.0	U	<	4.00	10.0	U	<	2.00	5.00	U	<	2.00	5.00	U	<	2.00	5.00	U	<	3.33	8.33	U
NEtFOSAA	-	<	8.00	10.0	U	<	8.00	10.0	U	<	8.00	10.0	U	<	4.00	5.00	U	<	4.00	5.00	U	<	4.00	5.00	U	<	6.67	8.33	U
NMeFOSAA	-	<	8.00	10.0	U	<	8.00	10.0	U	<	8.00	10.0	U	<	4.00	5.00	U	<	4.00	5.00	U	<	4.00	5.00	U	<	6.67	8.33	U
PFBA	-	4.84	4.00	10.0	J	<	4.00	10.0	U	45.8	4.00	10.0		3.38	2.00	5.00	J	5.03	2.00	5.00		5.32	2.00	5.00		<	3.33	8.33	U
PFBS	40000	18.5	4.00	10.0		2.07	4.00	10.0	J	14.6	4.00	10.0		<	2.00	5.00	U	<	2.00	5.00	U	<	2.00	5.00	U	<	3.33	8.33	U
PFDA	-	<	4.00	10.0	U	<	4.00	10.0	U	<	4.00	10.0	U	<	2.00	5.00	U	<	2.00	5.00	U	<	2.00	5.00	U	<	3.33	8.33	U
PFDoA	-	<	4.00	10.0	U	<	4.00	10.0	U	<	4.00	10.0	U	<	2.00	5.00	U	<	2.00	5.00	U	<	2.00	5.00	U	<	3.33	8.33	U
PFHpA	-	<	4.00	10.0	U	<	4.00	10.0	U	25.3	4.00	10.0		2.47	2.00	5.00	J	<	2.00	5.00	U	<	2.00	5.00	U	<	3.33	8.33	U
PFHxA	-	16.8	4.00	10.0		2.40	4.00	10.0	J	116	4.00	10.0		3.52	2.00	5.00	J	5.11	2.00	5.00		1.36	2.00	5.00	J	<	3.33	8.33	U
PFHxS	-	3.91	4.00	10.0	J	5.86	4.00	10.0	J	88.3	4.00	10.0		2.66	2.00	5.00	J	2.27	2.00	5.00	J	0.955	2.00	5.00	J	<	3.33	8.33	U
PFNA	-	<	4.00	10.0	U	<	4.00	10.0	U	<	4.00	10.0	U	<	2.00	5.00	U	<	2.00	5.00	U	<	2.00	5.00	U	<	3.33	8.33	U
PFOA	40	<	4.00	10.0	U	<	4.00	10.0	U	12.8	4.00	10.0		1.71	2.00	5.00	J+	<	2.00	5.00	U	<	2.00	5.00	U	<	3.33	8.33	U
PFOS	40	2.28	4.00	10.0	J	2.32	4.00	10.0	J	8.50	4.00	10.0	J	<	2.00	5.00	U	<	2.00	5.00	U	1.10	2.00	5.00	J	<	3.33	8.33	U
PFPeA	-	5.85	4.00	10.0	J	<	4.00	10.0	U	178	4.00	10.0		4.65	2.00	5.00	J	6.49	2.00	5.00		<	2.00	5.00	U	<	3.33	8.33	U
PFTeDA	-	<	4.00	10.0	U	<	4.00	10.0	U	<	4.00	10.0	U	<	2.00	5.00	U	<	2.00	5.00	U	<	2.00	5.00	U	<	3.33	8.33	U
PFTrDA	-	<	4.00	10.0	U	<	4.00	10.0	U	<	4.00	10.0	U	<	2.00	5.00	U	<	2.00	5.00	U	<	2.00	5.00	U	<	3.33	8.33	U
PFUnDA	-	<	4.00	10.0	U	<	4.00	10.0	U	<	4.00	10.0	U	<	2.00	5.00	U	<	2.00	5.00	U	<	2.00	5.00	U	<	3.33	8.33	U

**Grey F#** Detected concentration exceeded OSD Screening Levels

**References**

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PFPeA	perfluoropentanoic acid
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**Appendix F Laboratory Data  
Groundwater  
Site Inspection Report, Fort William Henry Harrison**

Area of Interest		AOI3			
Sample ID		PH-2			
Sample Date		05/30/2019			
Analyte	OSD Screening Level <sup>a</sup>	Result	LOD	LOQ	Qual
<b>Water, PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (ng/L)</b>					
6:2 FTS	-	<	3.33	8.33	U
8:2 FTS	-	<	3.33	8.33	U
NEtFOSAA	-	<	6.67	8.33	U
NMeFOSAA	-	<	6.67	8.33	U
PFBA	-	<	3.33	8.33	U
PFBS	40000	<	3.33	8.33	U
PFDA	-	<	3.33	8.33	U
PFDaA	-	<	3.33	8.33	U
PFHpA	-	<	3.33	8.33	U
PFHxA	-	<	3.33	8.33	U
PFHxS	-	<	3.33	8.33	U
PFNA	-	<	3.33	8.33	U
PFOA	40	<	3.33	8.33	U
PFOS	40	<	3.33	8.33	U
PFPeA	-	<	3.33	8.33	U
PFTeDA	-	<	3.33	8.33	U
PFTrDA	-	<	3.33	8.33	U
PFUnDA	-	<	3.33	8.33	U

**Grey F#** Detected concentration exceeded OSD Screening Levels

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NMeFOSAA	N-methyl perfluorooctanesulfonamidoacetic acid
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFDaA	perfluorododecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid
PFTeDA	perfluorotetradecanoic acid
PFTrDA	perfluorotridecanoic acid
PFUnDA	perfluoro-n-undecanoic acid

**Acronyms and Abbreviations**

AOI	Area of Interest
DUP	Duplicate
GW	Groundwater
HQ	Hazard quotient
LCMSMS	Liquid Chromatography Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
OSD	Office of the Secretary of Defense
QSM	Quality Systems Manual
Qual	Interpreted Qualifier
USEPA	United States Environmental Protection Agency
ng/L	nanogram per liter
-	Not applicable
<	analyte not detected above the LOD

## **Appendix G**

### **Laboratory Reports**



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Due to file size, laboratory reports are provided electronically (CD) in the final report or can be requested.

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